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United States Department of Agriculture

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Learning More About Cows

Condensed from American Agriculturist

A. James Hall

DR. JOHN W. BARTLETT, head of the department of dairy husbandry at the State College and Experiment Station at Rutgers, New Jersey, has spent 15 years of his life on a research and experimental program to bring the butterfat content of Holstein milk up to a level demanded by housewives. He has succeeded in raising the fat percentage in a Holstein herd from an average of 3.6% to 3.9% during that time. Of even more importance to Holstein men, milk production per cow has also increased an average of 2,000 pounds.

Dr. Bartlett started with the college in 1914, left for a couple of years in 1920, and then returned as head of the department. When hard times hit the milk business in 1929, retailers started competitive advertising that swung the public's taste and demand to higher test milk. This reached such a peak that many farmers started getting rid of Holsteins for other breeds to meet market demands, and consequently were suffering volume loss to achieve higher test.

Based on the New York Area premium of four cents for each 1/10th of 1% of fat over 3.5, this was not profitable for New Jersey dairymen and Dr. Bartlett decided to do something about it. He saw his opportunity in 1931 when the late James M. Turner of Montclair gave the college his 1,200 acre dairy farm at Beemerville in Sussex County.

Bartlett searched the Northeast to get together a foundation herd of 40 cows in the 3.6% to 4.3% test group and through DHIA associations found four sires capable of transmitting high fat to daughters. After six years it was found that only one of the bulls was of a family that could stand intensive breeding, and the whole New Jersey Experiment Station Holstein herd now traces back to the famed Ormsby Sensation 45th. Bartlett's inbreeding

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brought out weaknesses as well as desired characteristics and these weaknesses were weeded out through the years.

Dr. Bartlett wanted to develop a family to produce 15,000 pounds of 4% milk and practically has that now, on a mature basis. In fact he could have those averages by merely eliminating one or two of the lower producers. In addition to raising fat test and production, the Bartlett-bred Holstein Friesian cattle are healthy, very true to type, and some weigh even more than their forebears.

The College's aim is to produce sires from this herd that will have inheritance traits strongly enough developed to pass 4% production on in other herds. This year 30 bulls in the herd are being used in artificial insemination breeding associations—20 of them in New Jersey. Breeders have bought many and are selling progeny throughout the country.

Dr. Bartlett claims that the entire State Holstein herd might eventually be descended from one bull. As it is, the descendants or Ormsby Sensation 45th in the Northeast now number more than New Jersey's total cow population of about 150,000. Quite a record in 15 years!

Pride of the bull pen at the Dairy Research Farm, as the former Turner place is called, are Conqueror and Chief, two sons of the 45th resulting from breeding two daughters back to their own sire. Conqueror has had 23 pairs of daughters and dams with the former averaging 3.91% fat and 15,890 milk to the dams' 3.47%-15,110, to give him an index of 16,670 milk, 4.35% test and 725 pounds fat. Chief figures on 19 pairs show dams 15,800-3.76 and daughters 16,570-3.79% for an index of 17,340-3.82%-662 pounds fat.

Bartlett says that when inbreeding doesn't work, it's due to weak inherent factors rather than to the method; and that there is almost no limit to the inbreeding program as long as these weaknesses are found and removed. He found that inbred sires increased fat test twice as fast as out-crossed sires, and that sire and dam can have an equal influence on progeny.

Licking Mastitis

Another interesting breeding test is being carried on at the Research Farm in conjunction with mastitis studies of Dr. James M. Murphy. He says there are only two families in the Station Guernsey herd worth talking about: one which has very little and one which has a lot of resistance to mastitis. This leads the researchers to believe there is an inherited resistance, so a breeding project is being set up for both families. Certain

animals, to serve as controls, will not be included.

Dr. Bartlett will supervise the breeding program. He said that in three generations of one family—all descended from one cow—only 9% of the quarters have shown a reaction to tests for mastitis. For better observation, the breeding will be designed to intensify traits in both families.

The mastitis program in which Dr. Murphy is engaged differs from that carried on by any other group in that he is not attempting to control the disease. He contends that there is "no satisfactory evidence that a cow's resistance to infection of the udder can be raised by the use of vaccination or other immunization procedures."

Dr. Murphy said they resisted urges to attempt control in an effort to first find out everything possible about mastitis. He says there are two principal reasons for present day treatments: 1. To get the cow over mastitis in order to use her milk. 2. To get rid of infection that's in the cow so she won't be harboring organisms harmful to herself and other cows in the future.

Penicillin is a wonderful drug, according to Murphy, for the control of mastitis, but he adds that it will be universally more efficient when someone develops a one-dose treatment method. The multiple doses now needed make it difficult to carry this work onto farms as it is carried on experimentally.

Bang's Disease

Dr. Herbert J. Metzger Jr., who seven years ago left the Cornell University Extension Service to join the dairy husbandry staff at Rutgers as associate research specialist in pathology, devotes most of his time to the study of the bane of dairymen's existence—Bang's Disease. Most of his work was carried on in the College herd at New Brunswick. Here one segregated herd is 100% vaccinated and free from virulent infection. These cows are placed in other herds for immunity tests. In another herd, infected animals are deliberately introduced to challenge immunity.

An unlooked-for challenge came in 1943 when Bang's Disease got into the big 140-cow herd on the Dairy Research Farm. Here was a problem to climax them all, for due to breeding, feeding and other studies being carried on in the herd, none of the cows could be segregated or removed. The reactors had to stay for the other programs, and the adult herd had 25% reactors!

In true scientific fashion it was decided that if nothing else, here was an opportunity to carry

on an experiment to show what would develop and what could be done in a farmer's herd if he did not get rid of reactors. In Aug. 1943, Dr. Metzger vaccinated, with various sized doses of Strain 19 vaccine, every animal in the herd except reactors. Detailed records of tests have been kept on each animal since then—a record which may in time prove invaluable in Bang's Disease research.

The peak number of probably-infected animals, 36%, came in May 1944. Since then, even though other programs have removed more negative than infected animals from the herd, the 'probably infected' percentage gradually dropped to 29.4 last fall. Later percentages have not been compiled, but there has been a steady drop.

Metzger believes that calfhood vaccination is most important in the dairy herd, even though results are not 100%.

Longer Lactation

Two most interesting dairy research projects are in the hands of Dr. R. P. Reece. His work pertains to the physiology of reproduction with emphasis on lactation. They are all big words mighty important to dairymen, because 14 to 16% of all dairy cows sold as beef are sold due to reproductive failure—heifers and old cows that fail to breed.

His work so far with the injection of estrogen (sex hormones) has brought several heifers to milk without calving, but he has found it more difficult to get old cows back on the production line when they fail to breed.

Dr. Reece's related work with thyro-protein has had much more gratifying results, tests showing definite increases in milk and fat production. Thyroprotein is a new drug still restricted from use except in experiments. It is made by chemically combining casein and iodine to give the same results as the very expensive desiccated thyroid or thyroxine. His very first experiments carried on for only three weeks showed definitely increased production. Since then, tests have been made of from 3 to 16 months with various cows, adding the thyroprotein to their feed except when they are dry.

Best results have occured when the treatment starts just after a cow reaches peak production. In tests, milk increase has varied from zero to 36%, while fat content has varied in increase from 10 to 50%, averaging about 22%. One Brown Swiss which was in production and failed to conceive was put on thyroprotein in the summer of '45, and this May was still milking 25 pounds a day. She's been producing that much for 19 straight months. Without

the stimulant she'd probably be dry. As a trial they stopped adding the food to her feed for 10 days and production dropped to 15 pounds. Back on it, production jumped back up too.

Bull Nutrition

There is less known about the proper feeding of bulls than of any farm animal and, despite the importance of herd sires, practically no work has been done on bull nutrition.

According to Dr. J. Thomas Reid who has been delving into the problem at the New Jersey Research Farm since last October, men have little idea of what or how to feed them other than by the general Morrison feeding standards. On some farms they get left-over hay and silage from the cows and everything from regular milk-making mash to dry cow feed.

To test the effect of diet on bulls, with particular emphasis on blood, reproductive urge and semen, 12 Holstein bull calves of similar age, weight, etc., were added to the farm herd for study. For their first 18 months they got ordinary dry cow fitting ration and pasture while blood, semen and other tests were made and recorded. Soon after they were brought in for winter, six were put on a well-rounded diet containing various minerals and vitamins and the others fed a poor diet consisting of 54% ground yellow corn, 25% beet pulp and the rest corn gluten meal, cane molasses and iodized salt.

Now Dr. Reid makes tests one day each two weeks of blood and semen, keeping an especially close watch on blood, which is usually first to reflect diet deficiencies. No deficiencies had developed when I was there, but when they do a very thorough study will be made to determine which diet components affect quantity, physical properties and longevity of semen. An attempt will be made to establish normal standards for bull's diet and semen, and progress is already being made in methods for semen tests less variable than those now in practice.

Reid has part way concluded a study of the effects of manganese on the calcium and phosphorus metabolism of cattle. First tests indicate that a commercial manganese product tends to keep a positive balance of these minerals in a cow. It is held by some that were cows to retain a positive balance during the peak of lactation, their longevity and life production might be increased.

"Balanced Farming" Comes to Kansas

Condensed from Kansas Farmer

Dick Mann

EVERY one of the 146,000 farms in Kansas is worthy of a practical, workable farm plan for more productive farming and more purposeful living. This is the theory upon which the Kansas State College Extension Service is launching a "Balanced Farming" program for the state.

Such a plan would provide for adequately financing the farm family budget; operating the enterprise at maximum capacity; soil conservation and water management; adding to soil fertility and productive capacity thru use of rotations and other soil-building practices, and by balancing livestock numbers with feed supplies available.

L. C. Williams, assistant dean of extension, will head the "Balanced Farming" program, and Frank Blecha, of the extension staff, will direct the educational work.

Three methods will be used experimentally to determine the best plan of carrying on the "Balanced Farming" educational program, says Mr. Blecha. The final plan may be one of these 3 or a combination of the 3, he explained.

Methods to be tried are as follows:

1. Hiring of assistant county agents to specialize on "Balanced Farming." These men will be trained to work directly with farmers, but will be backed up by the assistance of all specialists on the extension staff. These assistants would draw part of their salary from extension and part from the local association.

2. Butler and Wabaunsee counties have been selected for plan No. 2. Forty to 60 selected farmers will attend 2-day county meetings, bringing to the meetings aerial photographs of their farms and other information about their farms. The extension service will provide specialists in all phases of farm and farm-home planning. These specialists will meet with the farmers and assist them in planning their individual "Balanced Farming" programs.

3. Existing county agents will assume additional responsibility

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for the "Balanced Farming" program, with the assistance of extension specialists.

Extension specialists already have been trained for the new program, in schools held at the college, and in the field on selected farms.

A series of training schools will be held over the state during October and November to train district and county extension and home demonstration agents. Their training will consist of studying the fundamentals of overall farm and home planning, walking over demonstration farms and viewing the farms and homes accompanied by the farm families, then working with these families in completing balanced-farm programs. A special handbook on "Balanced Farming" is being drawn up at the college and will be available soon to all farm families interested.

Why do we need a "Balanced Farming" program, and does it mean scrapping of all past extension work, we asked Mr. Williams. This was his answer: "All present teaching methods of extension will be continued, but instead of treating each farm problem as an unrelated subject, we will coordinate all extension service to fit into the farm as a whole. What the farm family really is interested in is how to make the farm produce the highest possible net income, and to use that net income for the best possible farm living.

"The college extension service has no intention of making "Balanced Farming" plans for farmers to adopt as an ideal. What we want and hope to do is to meet with farm families and give them what technical help we have so they can do the best possible job of working out a long-range plan within their physical and economic means. If the program is successful, each farm family must work out its own plan. All we can do is help.

"Each farm and each home can best be planned by the family who owns or operates the farm. No one else is competent to undertake this responsibility. Many helpful suggestions can be obtained, however, from the experience of others, from research projects, and from demonstrations." This is the theory upon which the college will operate.

Under the new educational program, extension will assist farmers to set a definite goal, determine a plan of action, and study obstacles to be surmounted.

To help you understand how the new educational program works on a specific farm, we want to tell you about the experiences of the college specialists when they were training for this new service.

They chose a Riley county farm for experimental planning.

The farm contained 400 acres, of which 110 acres were in crops and the balance pasture. It is operated by a tenant under a stock-share lease and the major project is 50 head of Hereford cows.

Accompanied by the owner, teams of specialists toured the fields and inspected the farm home. Following this joint tour, all information obtained was pooled and specialists helped the farm owner work out a 5-year improvement program, based on the needs of the farm and to estimate the finances necessary to make those improvements.

This on-the-farm study disclosed that while the farm had been returning a fair interest on investment to the owner, production would never give the tenant an opportunity to better his position, and income would not provide for needed improvements to the farm home.

The answer to the problem was that the owner needed to rent or buy an additional 160 acres of crop land, since more volume was needed to make the unit economically sound. The owner, as a result, will buy the additional acreage.

Water disposal was found to be the No. 2 problem. A creek wandering across the farm cut fields into small units and was a constant flood threat to crops. A plan to straighten the creek and eliminate this problem was worked out by the farmer and specialists for future completion.

Rotation system on the farm was found to be good, but could be improved by planning fall and winter pasture to cut down winter-feeding cost. Ten to 12 acres of alfalfa used in the rotation were found to be too slow and will be replaced by sweet clover, seeded with oats.

To insure a stand of both oats and sweet clover, it was recommended that the oats be seeded by plugging every other hole in the drill, then following in a few weeks with sweet clover. By this rotation, the owner can cover 48 acres of his farm with sweet clover in 4 years, compared to 20 years with alfalfa.

There are 60 acres of corn on the farm. Specialists recommended treating the soil on this acreage with 100 pounds of nitrate an acre and seeding balbo rye in between the corn rows with a 1-horse drill. This will give the owner 20 to 30 additional acres of winter pasture following the corn harvest.

Ten brood sows were being carried on the farm and a good rotation program followed for keeping them on clean ground. However, there were no adequate farrowing quarters. A-type individual houses were obtained to solve this problem.

A new henhouse was recom-

mended for the 200-hen laying flock. Further study with the farmer disclosed, however, that it would take the profits from the flock for 10 to 12 years to pay for the new house. Thru careful planning, the old houses were remodeled at a cost of only $75. Production on the flock jumped from below average to well above average within a few months after this improvement was completed.

Egg production had dropped 50 per cent the previous July, because all water for the flock had to be carried a long distance and the tenant housewife could not physically keep a constant supply of fresh water on hand. Following the survey a new well was sunk and water piped to live stock and poultry.

Sixteen suggested improvements were made for the farm home. Major improvement needed was a water system. This will be provided later in the 5-year improvement program.

The farm wife had no place to do laundry except in the kitchen and had to carry all water. Plans now call for enclosing a back porch and making running water available from the home water system.

Rearrangement of the kitchen was suggested, with addition of built-in storage facilities. Lighting in the home was found to be inadequate and no outlets available for using electrical appliances. Two stoves were being used to heat the home. Suggested improvement was to use one stove plus a fan to get maximum circulation of heat at less cost and with less work. The farm wife also needed a fenced yard in which the small children could play to free her for household and farmstead duties, without danger of the children wandering off. This improvement already has been made by the owner.

These are just some of the problems found on the test farm. The owner is enthused over the results. "I never before had placed myself in the position of the family that had to live on my farm," he said. "By helping me to see the problems of my farm and farm tenants and to visualize the farm unit as a whole, the college has shown me how to make the needed improvements and how to make the farm pay for them."

Kansas is lucky enough to have a good head start on a "Balanced Farming" program, says Mr. Williams. There are about 11,000 farmers in the state who have soil-conservation plans completed for water management. About 2,100 have taken part in the farm-management program and have 12-year records on their farms as a basis

for study and improvement. Experiences of these farmers will help them progress and will serve as a source of information in working out the problems of other farmers in their respective communities.

Mr. Williams emphasized that the "Balanced Farming" program will not be a "blanket program." Every farm has its individual problems and must be studied and improved on that basis.

New Anesthetic for Horses

Condensed from The Cattleman

A NEW anesthetic, developed by army veterinary officers, and said to be safer for horses, as well as for the surgeons operating on them, has been reported recently in the Journal of the American Veterinary Medical Association.

The safety factor lies in the virtual elimination of kicking and floundering which often accompany a horse's reaction to an anesthetic.

Extensive testing at Fort Riley, Kansas, were the new formula was developed, has shown that the "excitement" stage is either negligible or absent, thus reducing the danger of injury either to the animal or the attendants, the veterinary organization reported.

Vicious and nervous animals lapse into a coma and do not rebel against the drug before losing consciousness, the research men found. Recovery is rapid, and the floundering which might cause injury at this stage is largely eliminated.

As another safety feature, veterinarians using the new formula have found that it is low in toxicity. Even a dose 100 per cent stronger than necessary for anesthesia was not fatal.

The new procedure consists simply of the addition of pentobarbital sodium to the solution already commonly used as an anesthetic for horses—a solution based on chloral hydrate and magnesium sulfate. The ingredients are placed in distilled water and administered intravenously in the jugular vein.

What DDT Does for Legumes

Condensed from Farm Journal

Tom Swearingen

For the last ten to fifteen years U. S. alfalfa and clover seed production has steadily sagged, and farmers have faced increasingly serious shortages.

A part of this decline is undoubtedly due to poor germination but there appear to be other causes. Iowa State college entomologists have tried another attack. This year they put DDT to work, and this summer they saw treated alfalfa growing 5 feet high, loaded with bloom, and giving promise of 3 to 4 bushels an acre seed yields.

Untreated fields nearby were not worth cutting for seed. Similar results showed in red and sweet clover.

Dr. Carl J. Drake, head of the Entomology and Zoology Department at Iowa State College, declares "there's nothing miraculous about it. "The DDT kills off insects that have always preyed on the plants. With the insects gone, the plants maintain their vigor."

Treated alfalfa plants in areas full of potato leafhoppers and other insects have two to three times more foliage than untreated plants. They also have a higher protein content, many times more blooms, and they choke out nearly all weeds by their vigorous growth.

Most striking evidence of the value of DDT treatments is in the color of the plants. In late August treated plots still were vivid green; the untreated areas —sapped by hordes of leafhoppers—were turning yellow.

DDT on alfalfa is not harmful to bees nor other pollinating insects if it is applied at the right time, Dr. Drake has found. He puts on the first spray or dust when the second growth is 6 to 8 inches high, and applies the final treatment just before blooming. If DDT is applied when the field is in bloom, the bees would be destroyed.

DDT treatment of alfalfa and clover will actually be a boon to beekeepers, Dr. Drake believes, because it increases the blooms on the plant as much as 500%. Treated fields are thick

Reprinted by permission from the Farm Journal, Phila., Pa., October, 1946

with wild bees, bumblebees, honey bees, and other pollen-gathering insects.

The second application kills the insects that feed on the bloom and seed. Some are so small that you need a microscope to see them. Some bore into young seeds like weevils, and others suck the plant juices from the immature seed.

Another type, the tiny seed chalcids and midges, lay eggs on the developing flowers. When the eggs hatch the larvae eat inside of the seed.

Unless the pests that feed on the flower and seed are killed, as well as those that destroy foliage, seed production will not be increased much by treatment, Dr. Drake has found.

So far DDT has showed the most promise of 15 different insecticides tried on alfalfa and clover. Its effect lasts longer, which makes it less expensive (Dr. Drake estimates that DDT treatment would cost $1 to $1.50 an acre).

Until further tests are run on feeding DDT-treated hay to livestock, Dr. Drake recommends it only for seed crops.

Two new insecticides which showed up well are PCH (developed by Dodge & Olcott, Incorporated, New York) and Ryanex (made by Merck & Company, Rahway, New Jersey). Neither has the lasting qualities of DDT as an insecticide on legumes, but neither is harmful to livestock. Both probably will be available by next year.

Dr. Drake uses a turbine sprayer-duster to apply DDT. It carries the dust in a fog so fine that it resembles dew and holds the DDT on the plants.

Fields on farms in four different parts of Iowa were used in this year's trials. Dr. Drake has found that fields near timbered or waste acres are best for growing seed, because of the larger number of pollinating insects.

Hay for Sale

Condensed from Eastern States Cooperator

TUCKED away in the rolling hills at Colchester, Vermont, is the Wilder Wheelock, Jr., registered Ayshire herd which goes to pasture in early April—and gets nothing but pasture grass until late October! That complete lack of concentrate seems unorthodox, but young Wheelock is convinced he is on the right road and tells why. His farming economy is based on the belief that cows are hay burners and not grain burners.

Questioned on the elimination of any grain feeding during the pasture season, Mr. Wheelock explained that when his cows are on pasture they just don't eat grain. The secret to that may be his method of changing to a new pasture as soon as the herd drops below a certain point of production rather than judging entirely by the amount of grazing apparently left on a field.

With much of his land having a muck clay subsoil, Wilder Wheelock is convinced that his conditions form the foundation of a true grassland operation, and that is the basis for all of his management practices. He is absolutely set against plowing except in the rather rare instances where a new seeding is to be established, or where a field needs to be leveled to permit rapid clipping, a practice which Mr. Wheelock considers very important. He figures that having adequate hay, pasture and grass silage provides him with more flexibility than other farmers who plow and plant corn and other cash crops. He says there will usually be a little ready cash handy from the Wheelock acres because his system consistently produces more hay than is needed and each year they have some to sell. He is convinced that in a farm operation which is dealing chiefly with producing feed nutrients for a milking herd that a surplus of hay is the least expensive cash crop he can produce, considering the necessary outlay both for labor and purchased supplies.

The Wheelock farm has been in sod for 30 to 40 years and it will stay just that way as long as they are able to keep a reasonable plant population of grasses and legumes. While the active management is now in the hands of Wilder, Jr., he apparently is following the philosophy of the elder Mr. Wheelock who is convinced that at least under

Reprinted by permission from the Eastern States Cooperator, Springfield, Mass., October, 1946

their conditions of soil and climate, if they do not let legumes go to seed they will stay in their fields indefinitely. He observes that all growth has a determination to reproduce itself and tries to remain thrifty until it does. Pastures are clipped twice each season to eliminate mature growth, to encourage new growth and to help avoid seed formation.

The Wheelock herd is rotated on four pastures. One 13-acre field in 1945 produced 32,000 pounds of milk in two grazings and cut 25 tons of good hay. This field is principally timothy and white clover. It was fertilized in 1944 with 10 loads of manure to the acre, with a 100-pound bag of *60 percent Superphosphate* added to each load. In March, 1945, it was limed and at that time also received 100 pounds of *Uramon* to the acre.

The Wheelocks have 50 acres of meadowland for mowing and 40 acres in pasture—some of which is also mowed when nature helps provide growth which the cows cannot keep up with. That is why with improved practices and a total of 62 head of cattle on the place (32 cows and 30 heifers) there is frequently hay for sale—in fact, $400 worth of hay was sold early this year from the 1945 harvest.

Wilder Wheelock, Jr., is definitely convinced of the advantages of ladino and bromegrass as pasture growth and declares it will be the basis of any new pasture seedings which they establish. In fact, one 11-acre field, which was plowed three years ago because its predominant growth was buttercup, paint brush, golden rod and dandelions, received a mixture containing two pounds of bromegrass, one pound of ladino and 12 pounds of timothy per acre. Ladino has now been spread over most of the farm from the 11-acre seeding . . . spread by blossoms that seeded below cutter bar level.

Use of manure is extensive with an attempt being made to get over the entire 90 acres of pasture and meadow every two years with about eight loads per acre. This has been supplemented, of course, with TVA *60 percent Superphosphate* plus three to four tons a year of 5-15-20 or 8-16-16 applied at the rate of 400 to 500 pounds per acre as far as it will stretch. One of Wilder Wheelock, Jr's., earliest recollections is that of seeing superphosphate being spread in his father's barn gutters. In fact, the practice is more than 20 years old with the Wheelocks, indicating their longtime interest in and practice of modern recommendations of better farming.

Being close observers of how nature responds, the Wheelocks

are convinced that potash is their number one need and they plan to apply it heavily as soon as availability of fertilizer will permit them to do so. Construction of a manure pit so that they can conserve more of the potash in manure through retention of all liquid stands at the head of the list of major projects they have listed for accomplishment in the near future. Much of the manure must now be piled and applied to hayland after hay is cut because the meadow is very low and subjected to flooding in the spring, making manure spreading quite impossible before grass growth gets a good start. Land liming is a standard practice with each acre getting about a ton every three years.

During 1945 the Wheelock milking herd of 30 cows produced 180,000 pounds of milk on only 10 tons of purchased feed. Of the 30 milkers, 16 were first calf heifers.

In last August, 1946, the herd was well on the way to producing 250,000 pounds of milk this year. July and August production was again highest for the year, being 25,000 pounds each month, or an increase of 25 percent over 1945.

To support the planned-for herd of 80 milkers, Wilder Wheelock has a definite program for bringing in more meadow and pasture on land which borders a 90-acre lake. This land has been only six to seven inches above the lake level, but by blasting a brook which is the lake's exit, the water level has been lowered 14 inches, making available for hay and pasture another 25 acres. When this drainage and reclamation project has been completed, it will be possible for the Wheelocks to have a total of 180 acres of improved hayland and pasture.

To further guarantee roughage for the rapidly expanding herd, another old, old pasture will be plowed this fall and two tons of lime to the acre harrowed in. Next spring it will get 300 pounds of *Eastern States* 5-15-20 fertilizer and then be seeded to ladino, timothy and bird's-foot trefoil. In the fall of 1947 it will get eight loads to the acre of manure—the manure fortified with *60 percent Superphosphate,* 100 pounds to the load.

In 1946 the Wheelock fertilizer usage was 32 tons of lime, five tons of *60 percent Superphosphate,* 25 bags of 60 percent potash and 57 bags of 5-15-20.

To prove his contention that cows are intended to be hay burners, Wilder Wheelock, Jr., points out that his production of plenty of good pasture and hay grown on well-fertilized soil and harvested early, plus grass

instead of corn silage, has reduced his costs to the point where he is producing milk for two dollars a hundred less than many other dairymen in his area. It can only be done by proper use and management of legumes combined with adequate fertilizer, he is sure.

Sheep Kill Bindweed

Fall-planted wheat and rye grazed by sheep in May and June, followed by Sudan grass grazed to time of fall rye planting has consistently eliminated bindweed in two seasons of grazing at the Lamberton, Minnesota, station for the investigation of noxious-weed control.

L. M. Stahler and Arne E. Carlson conducted three consecutive experiments on the subject, but none of the other combinations proved as successful as the one above. Grazing a pure stand of bindweed reduced the stand, but was not as efficient a treatment as grazing of crop plants and bindweed.

Sheep, in grazing, prefer the bindweed to wheat, so keep it clipped off close to the ground at all times. They graze alfalfa, brome, or bindweed without discrimination. Bindweed growing under wheat, Sudan, or rye is grazed in preference to bindweed exposed to full sunlight.

Yields of clipped forage of the crops and mixtures were greater than for a comparable well-established bluegrass pasture. Crude protein was at a high level, and the sheep made normal gains. The idea is thought practical on a field scale, especially in areas where land is not too expensive.

A heavy concentration of chickens did the same bindweed-killing job in even less time, but is practical on small plots only. Eighty chicks were started in May on a 12 x 12 plot. Left there until October, they clipped the bindweed so completely there was no regrowth.

—*Successful Farming*

How to Reduce BBB Replacement Costs

Condensed from Turkey World

Dr. M. A. Jull

University of Maryland

BREEDERS of Broad Breasted Bronze turkeys have made a notable contribution to the turkey industry by developing a strain of birds noted for a relatively high proportion of breast fleshing. Workers at the National Research Center, Beltsville, Maryland, determined the amount of breast and leg meat as a percentage of total edible meat in four varieties of dressed turkeys. The data they obtained should be of interest to all turkey breeders, because consumers in the future will be more particular than ever concerning "getting their money's worth" when purchasing turkeys. The percentage breast and leg meat of total edible meat in the four varities studied was as follows:

These data apply to the particular strains of each of the varieties studied. With other strains of the same variety, the situation might be somewhat different. Taking the above figures as representative, however, it is quite clear that the Broad Breasted Bronze could be expected to provide relatively more breast and leg meat in proportion to total edible meat in dressed turkeys than other varities.

Although the Broad Breasted Bronze excels in fleshing, there is a breeding problem of extreme importance to all BBB breeders. Based on an economic study of the cost of producing hatching eggs and poults in 1942 in the state of Washington, it was found that on the average only 53.4 salable poults were secured per 100 eggs produced. The study involved 61 breeding flocks, averaging 329 hens and 36 toms per flock, and the breeding season averaged 139 days per flock. Feed consumption averaged 72.7 pounds per bird, and egg production averaged 40.8 eggs per hen.

Obviously three things must be done to decrease flock-replacement costs in many BBB flocks; (1) higher egg production per bird; (2) higher fertility of eggs produced; (3) higher hatchability of fertile eggs.

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With respect to egg production, four varieties were compared at the National Agricultural Research Center, the birds being lighted artificially beginning January 15 and the breeding season terminating on May 31. The average egg production per bird was as follows:

Broad Brested Bronze	58.5
Beltsville Small-Type White	62.1
White Holland	63.2
Standardbred Bronze	76.1

The record of egg production of each variety is not an index of the laying ability of all birds or strains belonging to that variety. Undoubtedly there are BBB strains that lay much better than at the rate mentioned above, and, in fact, there are probably several flocks or strains of BBB that lay better on the average than many flocks or strains of other varieties of turkeys. Incidentally, there is great need for improving the laying ability of practically all turkey varieties.

The principal reason for this article, however, is to call to the attention of BBB breeders the need for improving fertility and hatchability. With this in mind, the results secured at the West Virginia Experiment Station with respect to fertility and hatchability in various purebred and crossbred matings involving BBB are given here. Each purebred male was mated to purebred females of the same variety as the male and to purebred females of another variety. (See table)

The first thing to observe in connection with the results from these purebred and crossbred matings is that in every case in which BBB females were used, fertility was lower than from the other hens used in the same mating. The second thing to note is that in three cases out of four, hatchability of fertile eggs was lower in the eggs of the BBB females than in the eggs of the other females in each mating. Thirdly, in three cases out of four, the percentage of poults hatched was lower from BBB hens than from other hens in each mating. The particular strain of Bourbon Reds used in this mating must have been a poor strain because the purebred Bourbon Red mating gave relatively low fertility and poor hatchability. Supposedly, it could be argued that the particular strain of BBB used in this experiment was also of poor quality. This probably is true, but it also probably is true that in many BBB flocks throughout the country fertility and hatchability are apt to be low, so that flock replacement costs are excessive, as in the case of the Washington flocks.

Flock replacement costs undoubtedly could be lowered considerably in due time if BBB breeders developed a breeding program with at least five objectives: (1) progeny test for higher egg production by selecting future breeders from among the progeny of families of full-sister dams that laid well; (2) determine whether or not the infertility that is reportedly high in so many flocks is actual infertility or whether much of the apparent infertility is due to early embryo mortality including embryos that die before the eggs are laid; (3) determine to what extent infertility may be due to the use of breast-heavy or improperly balanced toms or perhaps due to excessive differences between the size of toms and hens mated together; (4) use a fresh supply of toms about the middle of the breeding season to offset the usual decline in fertility and hatching results that so frequently occurs; (5) determine to what extent relatively low hatchability in many flocks is due to pullorum disease; (6) progeny test for high hatchability by selecting future breeding stock from families of full sisters giving high average hatchability of their eggs.

Results secured at the West Virginia Experiment Station with respect to fertility and hatchability in purebred and crossbred matings.

Kind of Mating		Fertile eggs, percent	Fertile eggs hatched percent	Total poults hatched percent
Males	Females			
Standardbred Bronze	Standardbred Bronze	89.9	66.8	60.2
	Broad Breasted Bronze	85.9	64.0	55.3
Broad Breasted Bronze	Broad Breasted Bronze	71.8	49.3	36.7
	Standardbred Bronze	89.6	65.8	58.2
Bourbon Red	Bourbon Red	70.9	62.2	44.7
	Broad Breasted Bronze	69.1	71.3	49.3
Broad Breasted Bronze	Broad Breasted Bronze	72.6	50.9	34.8
	Bourbon Red	90.6	58.9	53.9

That New Oat Disease

Condensed from Iowa Farm Science

H. C. Murphy

THE season was right for Iowa to have a record oat crop in 1946, but it was only average; the cause—the new blight and root-rot disease—Helminthosporium. It cut the yields of many fields, some in half.

Farmers knew something was wrong with their oats, but they were not sure what it was. The oats in many fields went down—matured too early. In some fields stands were poor. It wasn't rust, yet plants lodged.

The trouble was the new oat disease. It caused many seedlings to die. The leaves on the plants that survived were streaked with an orange to brownish color. Finally they shriveled and died before the heads filled as they should have. The stems at the nodes were dark, and they broke at these joints. Those who pulled up infected plants found that the roots were brown and dead—rotted off.

And that is Helminthosporium. The disease probably has been here (on certain grass crops) for a long time, but our older varieties of oats were resistant so that the disease didn't build up. Now we find that all of the varieties which have the crown rust resistance of the South American variety Victoria are susceptible to the disease. This list of varieties includes Boone, Tama, Control, Vicland, Cedar, Forvic, Vikota, Osage, Neosho and others. These varieties derived from Victoria hybrids have played an important role in increasing yields, because of their resistance to rust and smut, before Helminthosporium became a problem. Over 90 percent of our oats growth this year in Iowa was of these varieties. In the last few years they have added millions of badly needed bushels to Iowa's and the nation's oat crop.

Fortunately the two new varieties Clinton and Benton are resistant. They do not have Victoria as a parent. These varieties planted alongside Tama, Control, Boone and the others stood erect this year. They were free of disease.

Clinton oats were distributed to about five farmers in each county in Iowa (500 in all) for seed increase this year. The growers have produced about

Reprinted from Iowa Farm Science, Crews, Iowa, October, 1946

750,000 bushels or more of seed. Benton oats will be distributed this year in much the same manner as Clinton was last year. In all, there should be enough of these varieties to sow 375,000 acres in 1947.

If one allows 40 acres per farm, that would take care of a trifle more than 9,000 Iowa farmers. This is based on using 2 bushels of seed to the acre. Many who grew Clinton this year sowed only 1 to 1½ bushels to get the maximum increase from a limited amount of seed.

That still leaves a lot of farmers who will not have either the resistant Clinton or Benton. But, fortunately, we have another resistant variety, Marion, and there is a good deal of Marion seed in Iowa. In the past Marion had not been quite the equal of Tama and Boone in stiffness of straw and rust-resistance, but it had been close to them in yield. Now, in the presence of the new Helminthosporium, Marion has stiffer straw and is higher yielding than Tama and Boone.

Every farmer who has Marion oats this year should save all of it for seed. Even with the Marion that's available, there still probably will not be enough to insure that all our 1947 oats are of varieties resistant to this new disease.

Since we cannot possibly find enough of the resistant varieties to plant our oat acreage next year, many will have to use Tama, Boone, or some of the other varieties that are not resistant to Helminthosporium. In this case, our only hope seems to be to make sure that the seed oats are treated with New Improved Ceresan. This will not entirely control the disease, but it will reduce the losses. It will get most of the plants through the seedling stage.

We wanted to learn whether or not seed treatment might control the disease. So this year we treated various varieties that were resistant and those that were non-resistant. All of these were planted side by side. We selected some varieties that were badly diseased in 1945—about like the poorer fields of Tama, Boone and Control grown in Iowa this year.

Using badly diseased seed of a new variety, Overland (a selection from a cross of Victoria—Richland x Bannock), we found that it yielded only 30 bushels an acre when not treated. Dusting with New Improved Ceresan raised the yield to 49 bushels—an increase of 19 bushels per acre. This cost about 2 cents per bushel of seed or 5 cents an acre for the dust. Clinton oats, on the other hand, yielded only 1 bushel more when treated. Its yield was 88 bushels untreated and 89 bushels treated.

From our test this year, we think you might expect to increase the yield one-half or more from seed treatment if you are growing one of the non-resistant varieties such as Tama or Boone and your oat crop this year was badly diseased. Practically every county in Iowa has elevators or seed houses equipped for cleaning and treating seed. We feel certain that no farmer should run the risk of sowing such varieties as Tama or Boone in 1947 without treating the seed. The cost will probably be not more than 5 cents a bushel for cleaning and treating. It may mean the difference between a very poor crop and a fair yield.

Farmers whose oat fields this year were badly damaged by the new disease certainly stand a chance of even more loss next year unless they are able to plant resistant varieties or treat their seed.

The organism which causes this new disease is probably on all of the oats that will be sown in Iowa next year. The organism is carried on the seed and it is also found in the soil. It may be found on seed of Clinton, Benton and Marion, but they are resistant so it will do them no harm. When it is on seed of these others—Tama, Boone, Control, etc.—then it will "go to work." If you treat the seed—dust—then you probably can get most of the plants through the seedling stage. They may become infected later, but at least they will not die as seedlings.

This disease probably will be more damaging in warm years than in cool ones; 1946 was only about average. That makes us sit up and take notice. If it can cut yields of some fields in half in a year such as 1946, then in the most favorable years for the disease, its damage might be far more severe. We do not know exactly what weather and soil conditions are most favorable for the disease. We do know the disease can cause serious damage to susceptible varieties in seasons such as Iowa had in 1945 and 1946.

Factor in Cow Manure Stimulates Growth

Condensed from Poultry Tribune

H. R. Bird

U. S. Dept. of Agriculture

Feed formulas are like big-league ball teams in one respect. The same combinations that won pre-war pennants probably would not win now, even if they could be re-assembled.

Soybean oil meal was hardly more than a substitute on the team before the war, but the research and practical experience of the last few years have proved that it is capable of an all-star performance if given the right support.

In the year beginning October 1,1934, the production of soybean oil meal was only 279,000 tons, and the production of animal protein supplements (tankage, meat scrap, fish meal, and dried milk) was 888,000 tons. In the year beginning October 1, 1944, soybean oil meal production was 3,682,000 tons, and the production of animal protein supplements was 1,135,000 tons.

Naturally, not all of these products went into poultry feeds, but a major portion did. It is safe to say that, before the war, two-thirds to three-fourths of the total supply of protein supplements fed to poultry consisted of animal products, while the remainder was chiefly soybean oil meal. Now the situation has been reversed; two-thirds to three-fourths of the total protein supplement is soybean oil meal, and the remainder is largely animal protein supplements.

In emphasizing this change in proportions of plant and animal proteins, one must not forget that the figures also show a considerable increase in total supply of protein supplements.

The story of the increased utilization of soybean oil meal is a story of the hunt for proper teammates to perform with it. It was demonstrated more than 20 years ago that one important member of such a team is a source of calcium and phosphorus, such as bonemeal. Later it was found to be very important to include a good source of the B vitamins, especially riboflavin. During the war, certain fermentation residues have been important teammates of soybean meal because of their content of these vita-

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mins. Naturally, the minerals and vitamins just mentioned are required by all chickens. They are supplied in greater abundance by the animal protein supplements than by soybean oil meal; hence, the importance of team work when soybean oil meal is a major source of protein.

On the basis of these findings, it was possible to formulate diets which contained soybean oil meal as the only protein supplement and which supported very good egg production. However, such diets were not adequate for growth of chickens or hatchability of eggs. For these purposes they still had to be supplemented with three to five percent of a high quality animal protein supplement, preferably fish meal.

The proteins of soybean oil meal and fish meal were known to differ in their content of the different amino acids, the building blocks of which all proteins are made. At first it was thought that this difference explained the supplementary value of fish meal.

Work in a number of biochemical laboratories, however, soon cast doubt upon this explanation. The presence in fish meal of an unknown dietary factor was indicated by the results of recent experiments at the Agricultural Research Center, Beltsville, Md. It was found that dried cow manure was just as effective a supplement as fish meal, and that a crude concentrate could be prepared from cow manure which was as effective, when fed as 0.004 percent of the diet, as cow manure or fish meal fed as five percent of the diet. The high potency of the active material would seem to put it in a class with the vitamins rather than with the building blocks of proteins. However, it is not identical with any of the known vitamins.

You may wonder why anyone would try feeding cow manure to chickens in the first place. The basis for the first experiments was found in the reports from several laboratories that the rumen—the largest of the cow's four "stomachs"—is a first class vitamin factory, staffed by a competent force of microorganisms. Since vitamins are synthesized in the rumen, why shouldn't they be present in worthwhile concentration in the manure?

In the first experiments at Beltsville, the feeding of dried cow manure to chicks produced two startling effects. There was an outstanding improvement in growth when cow manure was added to certain "poor" diets, and there was a marked stimulation of the growth of combs and wattles. The latter effect was similar to that produced by the injection of male sex hormones. These results with cow manure

were reported by Dr. John C. Hammond in 1942.

The importance of the growth effect was obvious. The importance of the hormone-like effect could not be neglected either, since treatment with male hormones had been shown to interfere with the egg production of hens. In accordance with expectations, when hens were fed the cow manure that stimulated comb growth, their rate of egg production was only 38 percent, as compared with 48 percent production achieved by comparable hens fed no cow manure. However, this does not mean that the benefits of cow manure must be denied to laying hens, since drying the manure at 175 degrees F. destroys the hormone-like substance, without damaging the growth-promoting factor. It is of interest to note, also, that the manure of steers does not contain the hormone-like substance.

The feeding of cow manure to growing chickens did not influence the flavor of the meat.

Since the discovery of the growth-promoting value of cow manure came at a time when soybean oil meal had just assumed greatly increased importance, it was natural that the two should be tried together. The value of cow manure as a supplement to diets containing no animal proteins, but much soybean oil meal, was demonstrated by improved growth of chicks, improved hatchability of eggs, and improved early livability and growth of chicks hatched from such eggs.

In typical experiments, chicks fed five to eight percent of dried cow manure attained an average weight of 930 grams at ten weeks of age, while other chicks, fed a similar diet without cow manure, reached an average weight of only 620 grams at the same age. Hens fed five percent of cow manure maintained a hatchability rate of 81 percent of fertile eggs, and 91 percent of their chicks survived the first week of life, whereas comparable hens, fed the same diet without cow manure, maintained a hatchability rate of 66 percent, and 70 percent of their chicks survived the first week of life.

For the most part, the diets used, both in the studies of growth and in the studies of hatchability, were composed of corn, soybean oil meal, alfalfa meal, and mineral and vitamin supplements. They were complete with respect to the vitamins known to influence growth and hatchability. It seems, therefore, that the investigation of cow manure as a source of vitamins has unexpectedly uncovered a new dietary factor.

Another unexpected development concerns the site and manner of formation of this new fac-

tor. As stated previously, cow manure was originally tried, rather than the manure of some other species, because the cow has a rumen. It was found later that the fecal material of hens is as good a source of the factor as is cow manure, provided both are free of urinary excretions. Since the collection of such urine-free feces from hens necessitates a surgical operation, this finding is of experimental interest only. The factor is present in the feces of hens fed on diets which do not contain the factor; therefore, it must be formed as the feed passes through the digestive tract. Apparently the hen does not benefit greatly by this synthesis unless she consumes her own droppings.

The possibilities of cow manure—and perhaps the manure of other species—as a new teammate of soybean oil meal are considerable. There are difficulties, however. Undeniably, the prospective new member of the team comes from "the wrong side of the tracks." The inclusion of dried manure in commercial feeds would be a violation of most state feed laws. However, dried cow manure can be used by feeders that do their own mixing and it has been so used in a few cases with good results. There are other sources of the same dietary factor, notably fish meal, but supplies are inadequate.

It may be that commercial methods of processing manure will be developed so that concentrates can be prepared that are similar to those made in the laboratory. These would be suitable for use in commercial feeds. It is to be hoped also, that further study of the factor will reveal other possible sources, eventually including commercial synthesis.

Cooling Milk for Keeping Quality

Condensed from Certified Milk

W. L. Slatter

Department of Dairy Technology, Ohio State University, Columbus, Ohio

If excessive numbers of bacteria in milk are to be avoided, milk must be cooled to 55° F. or below within two hours after milking. It is just as important to cool milk quickly as it is to cool it to a low temperature. Water cools 21 times faster than air. Therefore, if milk is to be cooled rapidly, it must be cooled in water medium. The water level should be even with or above the level of milk in the cans. The cans should be spaced so the water can circulate around the cans. The lids should be placed on the cans tight. Stirring is not recommended because it speeds cooling only slightly and the stirring rod, as often used, may contribute many bacteria to the milk. A ten-gallon can of milk can be cooled from 95°F. to 50°F. or less if placed in circulating 35°F. water in one hour and to 42°F. in two hours. To maintain water at 35°F. would, of course, require mechanical refrigeration.

It's important to cool milk to a low temperature because the lower the temperature the less bacterial growth is possible. The following table shows this clearly. To get these results, the same milk was cooled to the temperatures indicated and held for 12 hours.

Temperature of Milk	Increase in Numbers of Bacteria
40° F.	Slight Increase
50° F.	5 Times
60° F.	15 Times
70° F.	700 Times

Excessive numbers of bacteria in milk are usually due to inefficient cooling. The greater the bacterial contamination of the milk during production, the faster the bacterial count of the milk increase. The most dependable and trouble-free cooling of milk is usually furnished by mechanical refrigeration. Drop-in mechanical cooling units are now made that work satisfactorily when placed in any properly insulated cooling tank. Well or spring water can serve as a suitable means of cooling milk. Difficulties with this means of cooling are usually due to using too little water or using water at too high a temperature approxi-

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mately eight gallons of water at 50°F. are required to cool one gallon of milk to 55°F.. In the summer when the most water is required, the supply is often limited. The temperature of the water used is often above 60°F. during hot weather when efficient cooling is most important. Often the water is sufficiently cold as it comes from the well or spring, but it is allowed to warm up before it gets to the milk-cooling tank.

Eggs When You Want Them

Condensed from Everybodys Poultry Magazine

G. T. Klein

Poultrymen who haven't tried fall-hatched chicks are frequently astonished at the way they perform. They have filled an important gap in many a modern poultry farm program as they did on the plants in Massachusetts, when fall hatching was first started 15 or more years ago.

Beginning in June and lasting well through December, eggs were short of demand and prices averaged a dime or so ahead of the rest of the year. If fall-hatched chicks would lay, why wouldn't they fill in during this high priced egg season? That was some of the reasoning back of the thoughts of those who dared to give it a trial.

Each year has more firmly established fall hatching as a worthwhile part of the program. Marketmen, too, would hate to see it go; it has given them a more uniform supply of eggs to handle the year around. If we could work out a program nationally that would give practically the same production of eggs each month, avoiding the spring gluts and the fall scarcity, it would help maintain high egg consumption, would benefit the entire industry, and might result in a higher average price.

The need for eggs varies in the different states. Probably there are few states except in New England where the shortage is felt as early as June. Here the need for eggs is noticed about the time vacationists come into the territory. Fall and winter-hatched birds take up production when hens fall off and some poultrymen plan to

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have more layers during the summer than at any other time.

In states where production isn't needed so early in the summer, it would be foolish to even consider fall birds. They are good birds, however, for supplying summer hatching eggs, which is another point to their credit.

Fall hatching was started with broods in October and November. Soon the poultrymen learned that the early October chicks did better than the later ones and gradually the hatching date was pushed forward to September and even late August, but layers are still hatched every month of the year, including November and December. The winter chicks are likely to be smaller in size and to lay smaller eggs, however, and are expensive to raise because they need heat longer.

The earlier hatchings give larger birds and larger egg sizes, and the pullets seem to be able to lay longer without a neck molt. The percentage of lay from birds of different hatches depends upon the egg production breeding back of the stock. The right kind of stock will go to 75 or 85 per cent while lower production birds hang around 50 per cent.

The fall layers are raised both on range and in brooder houses in confinement. The deep brooder houses now becoming popular make confinement rearing practical. It's impossible to make comparisons between range and confinement rearing because it's seldom that one finds both methods on the same farm using the same stock and hatching the two at the same time. Good pullets are raised both ways. There's some preference for range rearing however, because it's a little cheaper and, possibly, maturity is delayed more than with confinement rearing.

Among the recent experimental work that has a bearing on this point are tests on the kinds of rations that chickens in confinement must have. In a nut shell it's this: Confinement reared birds must have rations that are well supplied with vitamins. Rations similar in composition to starting mashes give better pullets than the cheaper mashes suitable for use on a good range.

You can't do very much about holding pullets back in maturity unless they are on the range. The only trick that really seems to work is to limit the amount of feed they are fed. This holds pullets back but it also gives lighter weight birds. Age of laying is influenced by heredity and by time of year of hatching. November, December and January hatched pullets are the earliest maturing.

You can't afford to do out-of-

season hatching without combining with it extra heavy culling. If you have new replacement pullets coming along, you can keep your pens at 60 per cent production, making meat out of birds or entire pens that are not doing well.

You won't want to turn to fall-hatched pullets entirely. They're just a part of a good management program. You'll have to think through your set-up and picture where they would fill in. Is there space to brood them? Where will they be housed when laying time comes? Those are some of the questions you've got to answer.

Working out the housing set up is the complicated part of this program. Here are some of the possibilities.

1. Move some layers to summer laying houses in May or June making room for pullets in laying pens.

2. Set up temporary shelters under trees to be used by layers finishing their year.

3. House summer layers in rooms in barn basements and other little used space.

4. Combine pens that are reduced in size by culling.

5. House layers in brooder houses for a part of the year.

In this program, some moving of hens from one pen to another is called for. The higher the production of the stock, the less it will be affected by a move.

Fertilizing for Yield and Soil Improvement

Condensed from Better Crops

R. E. Stephenson

Soils Department, Oregon State College, Corvallis, Oregon

THE amount as well as the kind of fertilizer to use on any particular crop is critically important for producing good yields, without which the principal incentive for the use of fertilizers would be lost. One hundred bushels of corn in the entire plant contains the equivalent nitrogen, phosphorus, and potassium supplied by more than 1,500 pounds of commercial fertilizer made up from nitrate of soda, superphosphate, and muriate of potash. Land must be naturally fertile or it must be enriched by liberal fertilization, and other factors such as moisture must be right, to produce 100 bushels of corn. Use of a small amount of fertilizer under the most favorable conditions probably will not result in a 100-bushel yield on land that has a 50-bushel natural capacity. To produce the extra 50 bushels and bring the yield to 100 bushels, if such a yield is possible, the corn must be enabled in some way to obtain nutrients equivalent to more than 750 pounds of fertilizer.

Effective fertilization of corn on Vigo silt loam is indicated by results from the Indiana Experiment Station, although 100-bushel production was not attained. With 150 pounds of 2-12-6 in the row the yield was 18 bushels, showing no increase over the unfertilized corn. With an additional 500 pounds of 10-10-10 used in plow-sole application, the yield was 37 bushels an acre. Use of 1,000 pounds of 10-10-10 brought the yield to 54 bushels, and 1,500 pounds yielded nearly 70 bushels an acre. Thus, while a light application in the row had no effect, an adequate amount properly placed produced good increases of four to six bushels of corn for each 100 pounds of fertilizer.

The common rates of farm application of fertilizer, therefore, are often much too small to produce the big yields that the best soils, well fertilized and managed, are capable of producing. Corn is about average in its nutrient requirements, and other crops to produce big yields would have

Reprinted from Better Crops with Plant Food, Washington, D. C., October, 1946

similar heavy demands for nutrients. Nitrogen, phosphorus, and potassium are only three of the eleven elements that crops take from the soil. Any one of the eleven essential nutrient elements coming from the soil may need supplementing before big yields can be obtained. Successful use of fertilizers depends in part upon correctly tracking down the one or more deficiencies that is limiting production.

Seldom, if ever, is all the nutrient supplied in fertilizer used by the immediate crop. A residue remains in the soil which will presumably have an effect upon future crops. Two-thirds or more of the phosphorus supplied in fertilizer may be fixed by the soil. If only the phosphorus needs of a 100-bushel corn crop were supplied entirely from fertilizer, 300 pounds of superphosphate per acre might suffice. Probably twice this much more must be used to satisfy soil fixation. Not fixation, however, but economic returns govern the amount of fertilizer that can be used on any crop.

There is no means of avoiding some fixation. The Massachusetts Station obtained 285 bushels of potatoes with a ton of 5-0-7 fertilizer, 393 bushels with a ton of 5-8-7, and 432 bushels with a ton of 5-16-7. These data indicate not only a need for phosphorus in the fertilizer program, but that a large excess over the needs of the crop must be supplied for good production A ton of 5-8-7 probably contained more than three times as much phosphorus as the crop used (assuming that none was contributed by the soil), and yet there was a yield increase of 39 bushels an acre when the phosphorus was doubled by using a ton of 5-16-7 fertilizer.

Making up deficiencies only seldom gives yield increases that are equivalent to the nutrient supplied in the fertilizer. At Massachusetts one ton of 5-8-0 produced 231 bushels of potatoes an acre. Probably a little more than half a pound of potash goes into the plant's nutrition for each bushel of potatoes produced. On this trial, a ton of 5-8-3 supplying 60 pounds of potash added 125 bushels to the yield, or a little more than a bushel for a half pound of potash. Larger additions of potash, however, had a lesser effect. One ton of 5-8-7 supplying 80 pounds more potash added only 37 bushels to the yield. A ton of 5-8-10 furnishing 60 pounds more potash than the previous treatment added only 25 bushels to the previous yield. Thus the yield increase dropped from two bushels to less than half a bushel for potatoes for each pound of potash as the fertilizer rate was increased, an example of the

functioning of the law of diminishing returns. Presumably only a part of the potash added was utilized by the crop; a part of the excess no doubt remained in soil to contribute to its improvement.

In contrast to phosphorus and potassium which are fixed by the soil, nitrogen cannot be long held except in combination with humus or plant materials. Most of the nitrogen applied as fertilizer is either used by the crop or soon leached and lost. Nitrogen can, however, be used in a soil-building program to grow humus materials, cover crops, and vigorous root systems which renew the soil humus.

To use nitrogen alone to grow crops that are harvested and sold may deplete the soil. Nitrogen is the growth element. The 100-bushel corn crop used nitrogen equivalent to that in 1,100 pounds of nitrate of soda. Liberal nitrogen fertilization enables the crop to remove the maximum of minerals, phosphorus and potassium, and other essential nutrients from the soil, and fertility exhaustion may be hastened as a result.

Good soils are relatively rich in available minerals. Soils of the desert, when watered, are sometimes phenomenally productive. Desert soils are unleached and are therefore rich in readily soluble minerals. Phosphatic limestone soils are usually fertile. These soils are especially rich in calcium and phosphorus, two elements that are commonly somewhat deficient in the soil and more so in the strongly leached acid soils. To bring about soil improvement, not only the nitrogen and humus must be renewed, but the mineral supply must be increased. Since it is probably impossible to correct a nutrient deficiency without at the same time leaving a residue of nutrients in the soil, fertilizing for big yields and fertilizing for soil improvement are two parts of one operation.

Fertilizing for both big yields and for soil improvement is most economically done on crops producing high-acre returns. In contrast to corn and wheat, which seldom gross more than $50 per acre, some crops may return several hundred dollars per acre. Thus hops in western Oregon, yielding a ton at 75 cents, return $1,500 per acre. A ton of fertilizer per acre on hops would be a smaller relative expense than perhaps 100 pounds of fertilizer on corn or wheat. However, the demand for nutrient may be just as great for the crop yielding a smaller return.

In western Oregon the most common nutrient deficiency is nitrogen. The soils are heavily leached by winter rains which remove the soluble nitrate and other nutrients. As warm sum-

mer weather with little or no rainfall comes, the surface soil dries and nitrification in the topsoil which contains most of the humus is stopped. Likewise the functioning of roots in the dry topsoil is stopped either by the dry condition of the soil or by deep cultivation, which destroys the roots. The crop is thereby left with only a limited supply of available nitrogen throughout most of the good growing weather.

In practice this difficulty may be partially overcome by early fertilization (February or March when possible) with nitrogen fertilizer. Next to nitrogen in importance as a deficiency are possibly phosphorus or sulfur, and frequently boron. Practically all soils and most crops respond to a nitrogen fertilizer. The response to the other nutrient elements may not be noticeable until the nitrogen deficiency has been corrected.

Garden and small fruit crops usually receive a complete fertilizer, which should supply sulfur in addition to the N-P-K as assurance against a possible shortage of sulfur. Boron in the form of borax at 30 pounds more or less an acre, according to the crop, is necessary for the production of some vegetables and other crops. Rates of use of fertilizer increase as growers gain experience and confidence in their use. The beginner not infrequently reports no returns or sometimes damage from the use of fertilizer because he fails to realize the importance of proper placement, or because too little has been used to produce an appreciable increase in yield.

Vary the Protein Content of Swine Rations

Condensed from American Hampshire Herdsman

R. H. Grummer

University of Wisconsin

THE protein requirement of swine has long been a topic of lively discussion. Results of feeding trials are sometimes contradictory and confusing. For example, recommendations for pigs on dry lot weighing between 50 and 100 pounds have varied all the way from 17 to 22 per cent protein. These contradictions can usually be explained by differences in quality and digestibility of the protein in the ration, and by differences in the age, health, and genetic make-up of the pigs used in the trials.

In normal times we are concerned chiefly with feeding a level of protein that will put on the fastest rate of gain, and consequently get the pigs to market at the earliest possible date. But these times are not normal, and today we should be interested in feeding a level of protein that will give us the best possible use of our protein supplement supplies. The hog producer's program of feed conservation should be a united program directed toward economically producing the most pounds of pork possible with the feed supplies that are available.

Use Pasture

Our greatest ally in conserving protein is pasture. Ordinarily we figure one can save around 20 per cent on feed costs by providing ample legume pasture for growing and fattening pigs. In case of emergency, this saving can be increased to 30 or 35 per cent. By hand-feeding the concentrate, the pigs will be forced to consume more pasture. There is definitely a limit to how much pasture one can force pigs to eat and still make it profitable. This is especially true with the very young pig. In general, hog men should be discouraged from carrying pigs over the summer on too low a feed intake. If one hasn't enough grain and protein feed to supplement the pasture so the pigs will gain .6 to .7 pound per day, it is better to sell part of the pigs to someone who has the feed.

Protein requirements for pigs on pasture are considerably less

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than in dry lot. The following are recommendations for conserving protein concentrate:

Packing sows being fattened for the market will do well on grain plus good pasture. Mature breeding stock can be maintained on good pasture alone. After market hogs reach 200 pounds they will do well on just grain and legume pasture, especially if part of the grain is high protein-grain, such as oats or wheat. The young animal should always have first call on the protein supply. If a limited supply of protein supplement is available, it is better to use the major part of it during the early growing period, rather than to try to spread it out over the entire period and not feed enough at any time.

In the off-pasture season or when dry-lot feeding, one has a source of protein available in good legume hay. One can economically include 15 per cent of good quality legume hay in growing and fattening pig rations, and go as high as 35 per cent in rations for mature animals.

Many pork producers who feed a mixed ration use the same protein level from weaning until the pigs are marketed. This is a waste of protein. It has always been recommended to change the protein level at least once during the normal feeding period, but with protein feeds scarce it should be changed twice, and even a third time, if the pigs are fed beyond a weight of 225 pounds. As the pig grows older, it puts on more fat in proportion to lean, and will gain faster if fed a ration with less protein.

One should be aware of the fact that if high-protein grains are used, less protein supplement is needed. For example, approximately half as much protein supplement is needed when feeding wheat as when feeding corn. So if all or a part of the ration is made up with such feeds as wheat, oats, or barley, the protein supplement should be adjusted acordingly.

Another thing that should be stressed more than ever, is that a combination of 2 or 3 different protein feeds is more efficient than any one fed alone Even a relatively poor quality feed will improve a ration when replacing partially a better quality protein feed.

Gains have been increased as much as 25 per cent and feed costs have been reduced as much as 15 per cent by feeding more than one kind of protein feed. However, little benefit can be obtained by feeding more than 3 kinds.

Balancing rations properly means a saving of both protein concentrate and grain. To stretch

our feed supply, every pork producer should see to it that he is feeding the proper level of protein. The hog will do a pretty fair job at balancing its own ration when fed free-choice style, and this method of feeding has been advocated in preference to guesswork with a complete mixture. But it is my opinion that in these times the free-choice method should be abandoned for exactness that can be gained by mixing the grain with the protein concentrate. When feeds of unequal palatability are offered free-choice, a pig will not balance its own ration. For example, soybean oil meal is very palatable, and if fed free-choice with any kind of grain, the pigs will usually eat more than is necessary.

Weight of Pig	Per Cent Protein when on Legume Pasture	Per Cent Protein when on other Pasture (Rape, Sudan grass, etc.)	Per Cent Protein when on Dry Lot
Weaning to 75 lbs.....	15	17	19
75 to 125 lbs.	13	15	17
125 to 225 lbs.	11	13	15
Over 225	9	11	13

The Great American Bird

Philip Ferry

WHEN patriotic Americans make holiday speeches urging the adoption of the turkey as our national emblem in place of the bald eagle, they have history, tradition and logic to support their arguments. The eagle as a genus is more or less common international property. Indigenous to almost every continent and employed as a symbol by at least a dozen different nations, it has lost all power to identify itself with any particular country or people. The turkey on the other hand is a native American bird and appears on the crest of no nation.

The proposal for the turkey's adoption is no recent movement but one that was advocated two centuries ago by no less an authority than Benjamin Franklin. Paradoxically, the turkey which would be thus elevated to stardom is not the familiar bird that graces our tables on Thanksgiving and Christmas days. The latter is a Mexican species with a somewhat confused genealogy. Popular in Mexico since before the Spanish conquest, and called a double-chinned rooster by Montezuma, the turkey was held in such esteem by the Aztecs that life-size models were fashioned in gold.

Tradition has it that this Mexican bird was carried across the Atlantic to Spain in 1519. From there it moved to France, Italy, England and Turkey, from which country it took its name. Amusingly enough, in Turkey the bird is known as the Hindi, which means Indian or American bird. A century later the Pilgrims brought the bird back to the New World in the hold of the Mayflower. It is this Mexican-European importation that is popularly supposed to have fathered our present day domesticated turkey crop. There is little doubt that our domesticated turkey is a descendant of the Mexican species. Evidence of its Mexican ancestry is shown in the white-tipped tail and rump feathers, as against the chestnut-colored tips of the wild turkey of North Amercia.

The bird the Pilgrim Fathers enjoyed at that first Thanksgiving feast was the wild North American species. This bird was plentiful in the New England woods and the half-starved Pilgrims received gifts of wild turkey from the friendly Indians. The wild turkey is native to

North America and once ranged in great numbers from the eastern seaboard west to the Rockies. It is our largest upland game bird and as such was a favorite of Kit Carson and the rest of that brave band of American fur trappers who first penetrated the Far West at the beginning of the 19th century. In those early years, the Indians of our Southwest, who rasied the bird solely for the feathers, sold turkeys to the white settlers for one dollar each. In Lincoln's youth wild turkey shoots were a favorite sport of the sharpshooting riflemen of that day.

The native bird gave way rapidly before advancing civilization and is now extinct over most of the country, surviving only in sections where it has been given organized protection. Overgrazing and the hewing away of the forest had much to do with its disappearance. Since the bird will flourish only in heavily wooded areas, the removal of the natural cover deprived it of the green plants, acorns, berries, pine nuts and insects which form its chief food. Only in the sparsely settled sections of the Southwest is it making a bid for survival. In Texas, the vast King Ranch is a refuge for sizable flocks of wild turkey. In the Coconino turkey refuge in Arizona where control is exerted over such predators as coyote, foxes, house cats, eagles, mountain lion, and poachers, the wild turkey is showing such progress that hopeful sportsmen look forward to the day when there will be an open season on the bird.

Our concern over the fate of the wild bird has not blinded American growers to the value of the tamed variety. So flourishing is commercial turkey raising that such widely scattered communities as Harrisonburg, Virginia (which raises nearly a half million turkeys annually), and the town of Ramona, California, each has its annual Turkey Festival. In the past ten years United States turkey production has increased a hundredfold and turkey growers are now engaged in developing a breed of bird of a size and weight suitable for apartment house ovens and small-family use. Thus it is hoped to create an all-year market for the luscious fowl in place of the short holiday season that now prevails.

During the war the turkey was given added prominence because of the United States Government's demands for millions of pounds of turkey for those in the armed forces. Regulations of the United States army require that roast turkey be served our boys every Thanksgiving Day.

Production or Reproduction

Condensed from The Shorthorn World

Dr. Carl W. Gay

Columbus, Ohio

SALES of purebred cattle of the past few years have been characterized not only by the good prices which have prevailed but by the number of new comers among the buyers. This is a good thing for it indicates not only expansion of breed interests but stability and security for the future. As long as the same old breeders are trading around among themselves operations are restricted as to scope and limited in price range. But the advent of new breeders has a stimulating effect on the business. Even tho they may not succeed in their new venture and their term of activity as breeders may be short, their influence is good while it lasts. It behooves the fraternity of breeders and the breed association to see to it that these newcomers do stay in and the most effective bond to hold them is success in their initial breeding enterprise.

The established breeders to whom they go for foundation stock and herd sires have much to do with this. Instead of marking the newcomer as more or less of a sucker and exploiting his inexperience, breeders should gang up to see that the novice gets cattle worth the money he pays for them, of such breeding and character as will insure, as nearly as possible, a reasonable degree of early success from his operation. Regard him not as a competitor but as a patron, perhaps directly and certainly indirectly, advancing your own interests.

Make him a booster and he may lend substantial support to the breed enterprise in which you are heavily invested. A disgruntled new breeder who has spent a lot of money but has been misinformed or ill advised in his cattle investments may, as a result, become an ambassador of ill will and an extremely destructive influence in breed promotion. Such failures are serious in the over-all picture and should not be allowed to develop.

One of the most confusing and misleading items in the selection of foundation stock by the uninitiated is high condition or fat.

Reprinted by permission from the Shorthorn World, Aurora, Ill., Aug. 10, 1946

It truly may cover up a multitude of faults yet it is the guiding star of too many newcomers in the cattle business. They won't buy them unless they are loaded with fat yet they can't understand why they did buy them when the fat has disappeared. If a prospective buyer or breeder is obsessed with the single purpose of taking only the fat ones and refuses to become interested in one that is just in breeding condition he is away off the beam and seriously in need of competent, honest guidance.

When fitting for show or sale it certainly is in order to attempt to improve an animal's appearance as much as possible and by every available and legitimate means. This is where fat comes into the picture. And fat has a definite place if the picture is interpreted properly. It makes a contribution to or detracts from the desired end, depending upon the nature of production involved. The fatter the meat animal the higher he will yield in carcass, while fat is a serious cause of impotency and barrenness in breeding animals. When lard used to command a price comparable to the value of the balance of the carcass its maximum production in the lard type hog was sought but in the face of lard's competition with substitutes a meatier type of hog now is demanded. Fat is favored in the draft horse as its added weight increases traction and becomes a real aid in pulling, but every pound of fat carried by the race horse constitutes a handicap to his speed. It is impossible therefore to make any blanket disposition of this subject of fat. Circumstances alter cases and whether or not high condition is desirable depends upon the use to which the animal in question is to be put.

Condition in the fat steer and condition in breeding cattle are independent though related matters and what was written concerning fat cattle must be completely revised for its application to breeding cattle. The general conclusion from the discussion of the condition desired in fat cattle must have been that the extreme of fatness was warranted in view of the circumstances attending the fitting and showing of these cattle. In other words the story constituted a defense of the practice. No such application of the same conclusion can be made to breeding cattle. An excess of fat is most detrimental to breeding stock.

The objectives in fitting fat and breeding cattle are entirely different. The steer's job is production (beef) while the bull or breeding female makes good or fails at reproduction. The pur-

pose of the one is best served by conditions which actually antagonize the purpose of the other. There is ample evidence that to carry on the battle of the feeders as it is practised in fitting for show in fat classes would result in serious injury to breeding males and females. To be sure, the fitting of breeding cattle is almost as much a herdsman's competition, so far as the tops are concerned, as fitting steers but a different technique is employed and the relative importance of condition versus things other than condition is quite different in the two instances. The judge of breeding stock must stress much that is in no way influenced by the amount of fat the animal carries. He has much more justification for placing up an individual somewhat deficient in condition than the judge of steers has.

Type, conformation, natural flesh, quality, constitution, character and color carry great weight in determining relative merit in breeding cattle and those best endowed with these attributes should win, regardless of condition, but they rarely do. Too often, one sees ribbons in the show ring and bids in the auction follow the course of greatest fat which seems to be the line of least resistance to many people.

To the trained eye and hand of the skilled cattle judge the sight and touch of an otherwise acceptable beast that has his fat put on in layers and roughed up in rolls on the loin edge and last ribs and patches at pin-bones, is a sad experience. Yet it is more distressing still to see one that has nothing else to commend it favored by judge or bidder because of fat and fat alone.

What then is the optimum or best condition into which a breeding bull or female should be fitted? The answer is that he or she should be sufficiently fat to indicate feeding capacity, ability to fatten rapidly, yet smoothly and to attain the degree of condition which accentuates their good points and possibly obscures some of their faults. This much can be attained without jeopardizing the potency of the bulls and the fecundity or breeding power of the females. In fact, one of the extra special skills of the fitter of breeding cattle is to sense when this stage of condition is reached.

Then, too, fitting of breeding cattle is a two-way proposition while the fitting of fat cattle is going one way only and slaughter marks the end of the route. There is about, if not quite, as much skill required to successfully "let down" a fitted breeding animal as to get them up there in the first place successfully with no damage resulting. Like the fitting process

itself the results of letting down depend upon how it is accomplished.

To the untrained, fitting consists of throwing in the feed in ample amounts to insure fattening, but with no regard for such regulation of either quantity or quality as will keep the cattle always keen for the next feed. So combining the various constituents of the ration as to obtain the proper consistency of covering with no tendency to become uneven or overdone is never the thought.

The skilled feeder knows that corn must be supplemented with protein concentrates to get the best results from its use and that corn firms the fleshing, while barley mellows it up if it gets too hard. Linseed oilmeal and bran are conditioners as well as feeds, and their liberal use promotes sappiness and bloom.

Older animals are more likely to accumulate fat in rolls and patches than younger ones, therefore smoothness and mellow touch are especially important considerations in breeding cattle which go to the shows, many of them at greater ages than fat cattle which are limited in age and size to a weight range of 750 to 1400 pounds.

A great deal of educational work needs to be done to inform the newcomers of the significance of fat in breeding cattle. The misinformed may swing to an extreme point of view. For instance, the best breeding cow of either beef breed in the Ohio State University herd was fitted and shown successfully as a heifer calf. In show condition she was unreservedly condemned by one of the University veterinarians because she was too fat ever to breed. That might have been so had she not been handled by a master fitter skilled in the "letting down" process. As a matter of fact she has been a regular breeder and at nine years of age she has seven calves to her credit and is a great-grandmother. Being fat did her no harm because it was of reasonable amount skillfully put on and taken off.

The notion that any fat at all is foreign and opposed to the best production of beef cattle is held by many but there is no basis for this erroneous idea. On the contrary it is perfectly natural for a beef-bred one to carry a medium amount of fat even in breeding condition on roughage and pasture alone. It is the nature of the beast and they are recommended by this manifest propensity to fatten. Many serious mistakes may be charged to this misconception. A case in point — a very successful breeder of dairy cattle, on account of labor difficulties switched to pure-bred beef cattle and bought liberally and discreetly both sire

and foundation females. The herdsmen, however, never could make the necessary adjustment of the eye, geared to dairy form, and he remained possessed of the idea that fat was inimical to all that of which beef cattle are capable. He purposely saw to it that his cattle were so lean and spare that the first sight of them in their new home was a shock to the people who had sold them.

There are drugs that are most useful in moderate doses but poison in large quantities and so it is with fat in breeding cattle. A certain amount is desirable but too much is definitely injurious. It is the internal fat that causes the greatest damage but beef-bred cattle do not accumulate an excess of internal fat as early nor as readily in the fattening process as do dairy cattle. It is only when they are unskillfully carried too far in too high condition that shy breeding or complete sterility result.

Horsemen call fat "the best color" meaning, of course, that it accomplishes eye appeal and sets off an animal's appearance. Qualified buyers and judges of breeding stock are not mislead by this camouflage. Our final conclusion must be that fat enhances appearances and covers up many faults but at the same time it may impair seriously the breeding efficiency of either sex if carelessly or unskilfully employed.

Timothy

Marietta, the new improved variety developed by the Ohio Experiment Station and the United States Department of Agriculture, is now available in limited quantities. The late Lorain variety is also being increased so that seed is gradually becoming available to special growers.

—*Successful Farming*

Electricity Speeds Tomato Production

Condensed from Pennsylvania Farmer

W. W. Carson

EVERY one knows that when you grow any fruit or vegetable indoors you have to reckon with the problem of pollenization—which, in outdoor growing, is taken care of by wind and insects. When L. S. Wilcox, greenhouse operator of Freeport, Pa., first started indoor production of tomatoes on a big scale, he introduced pollenization among his plants by the slow and tedious method of tapping.

His employees would walk up and down the long rows of tomato plants and tap the blossoms with a long stick fashioned from a twig. This method was not only slow and tedious, but it could be used only if the blossoms were thoroughly dry. No amount of stick tapping would loosen the pollen on a damp or sticky day.

Mr. Wilcox and Robert Dempster, his greenhouse manager for seventeen years, knew there must be a simpler, faster, more efficient way of doing this work—and they decided to find it. They looked for an electrical device that would perform this service, but there was none to be had. They would fashion it themselves, but they couldn't even find new parts for the appliance they had in mind.

They did have an old vacuum cleaner, however, and they decided to convert it into an electric pollen blower. They removed the handle, bag, cord and suction nozzle. To the former bag outlet they attached a short piece of aluminum pipe and covered the end with a wire screen. For easier handling, they attached a short wooden handle to their new home-made appliance.

Their expense thus far had been negligible. They bought a 130-foot electric cord and installed additional outlets throughout the greenhouse—and here again their expense was only slight.

An Immediate Success

When they put the electric pollen blower to work, it proved itself immediately. Their weekly work schedule included two days for pollenizing. In order to keep to this schedule four persons were needed for the tapping job.

Reprinted by permission from Pennsylvania Farmer, Pittsburgh, Pa., Sept. 14, 1946

With the electric pollen blower, however, the two day a week job could be done by one person.

The superiority of electric pollenization is so great it has to be seen to be appreciated. Mr. Wilcox's nine greenhouses are grouped together into one unit covering an acre of ground. Altogether there are 45 rows with a total of 8,000 tomato plants, and each row is approximately 250 feet long.

The 130-foot electric cord permits the attendant to cover one-half the length of a row at a time from either the center or outside aisles, without the danger of entangling either himself or the plants. The blower is directed at the topmost blossoms. The pollen is completely loosened and scattered over the lower blossoms, which, under ordinary pollenizing methods, are often non-productive.

The electric pollen blower is gentle but effective. It blows loose all the valuable pollen and doesn't miss a single blossom. It never comes in direct contact with the blossoms. The danger of injury to either blossoms or plant is thereby eliminated. This has marked results, as will be shown.

Under ordinary methods of pollenizing, there was always the danger of injuring a blossom or knocking it off completely. This meant that Wilcox couldn't count on getting full production from the first blossoms. It also meant that injured blossoms produced blemished or otherwise crippled tomatoes.

Because the electric blower doesn't injure blossoms or knock them off, there is full production from first blossoms; the fruit is perfectly round and unblemished, and there are no cripples. This is one reason why Wilcox was able to start marketing as early as June 1 and continue until August 15. During this marketing season, he has shipped as much as 20 tons of tomatoes and has been able to get as high as 35c a pound for his No. 1 Grade in the early season.

When he started indoor production of tomatoes on a big scale, he decided to grow only Livingston Globes. He found this variety is best adapted to the forcing that is necessary in a greenhouse. It is also noted for its large yield and the electric pollen blower made possible a full quality as well as full quantity production.

All in all, the blower has made possible the planting of more tomatoes. It has reduced the time spent in inducing pollenization by 75 per cent. It has made possible better quality tomato yields and it has made greenhouse tomatoes growing more profitable.

Subterranean Clover Comes to American Fields

Condensed from The Jersey Bulletin

Howard Snyder

AUSTRALIAN Clover is new to us in America but for centuries it has grown in Southern Europe and North Africa as a wayside weed. It was carried to Australia in the hold of a ship by accident and began growing in Australia. It was there that its feeding qualities were learned accidentally. There are many strains grown in Australia and two of these varieties have proved successful in the U. S. These are Tallarook and Mt. Barker.

Australian Subterranean Clover is a winter annual but almost never fails to re-seed itself because of the fact that a part of the seed each season is pushed down into the soil from one-half to one inch deep. Hence, its name subterranean. It is these underground seed that make it one of the surest re-seeders in all the long list of winter annual legumes. At Sikeston in South East Missouri it has been grown in small experimental patches for 20 years and has not failed to re-seed itself. It has withstood 20° below zero weather at Sikeston without injury other than to the leaves. This is about as far north as it has been grown successfully.

The first crop of any size was grown at the Oregon Experimental Station at Corvallis in 1940. Since that time its spread up and down the Pacific Coast has been sensational. It is also grown from Texas all the way across the South to the Atlantic Coast.

It was brought to Oregon as a result of a wide search for something that would thrive on the washed-down, denuded, eroded, and abandoned hillsides of Oregon. It has been most successful in reclaiming those hillsides. It does best on just such well-drained land. It is not tolerant of wet, poorly drained bottom land.

Land can get too poor for even subterranean clover, but this is the exception, however. Subterranean clover will take and thrive where you cannot get a stand of Dutch White and where Ladino will be a total failure.

Along its northern limit subter-

Reprinted by permission from the Jersey Bulletin, Indianapolis, Indiana, Sept. 10, 1946

ranean clover should be seeded in late summer or early autumn. In the south it does well if seeded around October 1, but may be seeded in November. It should not be seeded anywhere until there is some moisture in the soil. It will begin growing rapidly with the fall rains. If seeded too late in fall it may suffer from heaving of the soil, and it will not have as much time for fall growing before winter cold slows it down.

If grown for pasture in combination with other plants 6 pounds of seed per acre give satisfactory results. If grown for seed or planted alone it is well to plant 8 to 10 pounds per acre. A better stand is almost certain if 10 pounds are planted, if a full stand is expected the first year.

Inoculation is absolutely necessary. Subterranean clover develops root nodules with the same nodule bacteria as white, ladino, red, crimson, and alsike clovers. This culture may be bought from local seedmen and applied according to directions on the container. On fields where the common clovers mentioned above are growing successfully and show healthy nodulation, subterranean clover will generally develop nodules if no culture is applied to the seed. At the experiment station at Corvallis, Ore., a special culture has been prepared for subterranean clover seed. If your neighbor has threshed subterranean clover straw from a well inoculated field you may inoculate your land by scattering this straw over your new field to be seeded to subterranean clover.

Subterranean clover seed is often broadcast on existing sod with good results. But in this case not much winter grazing may be expected the first winter. A part of the seed of this clover is hard. These often do not germinate until the second season. Therefore you may think the first seeding a failure, but the second season will tell you whether this is correct or not.

If seeded on a new seedbed that seedbed should be fallowed for the greater part of the summer. Break it early and do not rebreak it but harrow or cultivate it. After seeding it should be harrowed lightly. If seeded on oat land, drill in the oats first and then seed the clover seed. Cover lightly with harrow or brush drag.

A word of caution about winter grazing. Every farmer knows that this or any other clover can be damaged or ruined from tramping when the ground is too soft. Furthermore, in late spring live stock must be taken off in time for the new crop of seed to form. All livestock greatly relish the seed. Turkey growers have

found it a most desirable clover on which to pasture turkeys, but they will pick up all seed and scratch seed out of the ground if pastured too late on this clover. The same is true for hogs and geese. I am told by sheepmen in Oregon that it never causes bloat in their sheep, and cattle men say it is safe in this respect for the cows.

There will not be much hay on poor land, for on poor land it does not grow high. On the best of land it has made as much as four tons to the acre. The hay is rather hard to harvest but is most palatable. Like white clover, subterranean has creeping stems. On good ground it makes a dense mass of growth. Out in Oregon they have made a special cycle bar with fingers that reach out in front and lift up the runners and vines or creeping stems. They also have a suction attachment that sucks up seed that shatter off on the ground. By thrashing the hay and by suction as much as 300 pounds of seed have been harvested per acre. This still leaves the underground seed for reseeding when the plant dies in midsummer. When mowing the crop the bar should be tilted forward and the tractor operated in low gear in order to give the mower knife plenty of speed. This prevents pulling of the vines and clogging. Where the power-take-off mower is not used, the tractor should be operated at a higher speed.

How long can subterranean clover be pastured? I have known it to be pastured 6 months and still have time for 200 lbs. of seed per acre from the matured plant. It reaches good grazing height before anything yet grown in the South or in Oregon. It produces such a heavy growth that it chokes out weeds with much success.

There are many other advantages but the one big one is that it saves us high-priced concentrates and gives the cow a chance to save us labor in putting up hay. It gives a green, living winter feed and being green and alive it affords that all-important vitamin that makes cows look sleek and well-groomed in midwinter when so many cattle get rough hair and lose flesh because feed has lost a part or all of its vitamins.

Fertility in a Hurry

Condensed from Successful Farming

Emil Truog

University of Wisconsin

You may be working for half pay. The main cost of producing crops—as in manufacturing automobiles is labor. And your labor is pretty much the same per acre whether yields be low or high. Yield per acre casts a whole fistful of votes at the annual election which determines what your farm profit—or loss—shall be.

Let's be scientific for a moment. In the 12 North Central, Cornbelt States where nearly 60 per cent of the nation's food is produced, crop yields average *only about half of what they could be.* Present output would be nearly doubled if enough raw materials, such as lime and fertilizer elements, were present in the soil.

Now let's get away from science and back to you. You may think that doesn't apply to your farm. But the chances are it does. Some soils were never too well supplied with plant nutrients. Others, better supplied originally, have become depleted thru exhaustive cropping for 50 years or more. The best prairie soils were originally so blessed with plant food that crops on them are still about double those on most other soils. But their fertility—their supply of available raw materials — is going down rapidly.

Maybe you have your plans all laid to do something about it. You plan to add a little lime this year. Maybe a little fertilizer somewhere in each rotation. You figure you're a pretty progressive fellow if you can hold what fertility you have and add a little to it each year. In 10 or 15 years you're going to shove those corn yields 20 bushels above what you're getting now.

But in 10 or 15 years you will be 10 or 15 years older. You will have looked wistfully at a lot of tractors, automobiles, and kitchen stoves that you couldn't buy because your acres weren't yet producing enough to supply you with the money. What you want is fertility in a hurry — yields *this* season.

What is needed right now on most of the soils of the North Central States, with the excep-

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tion of the Dakotas and Kansas and Nebraska, is a heavy initial application of fertilizer and lime to make up a deficit of available nutrients which has always existed or has been created thru exhaustive cropping.

By heavy applications of fertilizer we mean that in many cases it has amounted to four or five tons of lime and the equivalent of 1,500 pounds of 0-20-20 per acre. Half of that is applied and disced in before plowing; the other half spread and disced in after plowing. That leaves the whole plow layer—top to bottom —uniformly treated. This creates a much better condition for crop production than to have the fertilizer applied in one dose and not thoroly incorporated with the soil for five or six years afterward.

This treatment will cost $40 to $50 per acre, depending on location. Of course, many will say—"the cost is exorbitant." But let's see what this treatment will do:

It will make good catches of alfalfa and clovers practically certain. It will insure against winterkilling. It will extend the life of alfalfa. It will double, treble, and quadruple yields in many cases, not only of the legumes, but also of other crops that follow. It will greatly improve the quality of the crop. It will cut the amount of legume seed needed in half. It will put the needed organic matter into the soil. It will greatly facilitate soil conservation. And finally, it will make $100 land produce what $200 and $300 land is now producing.

A surprising result of this heavy liming and fertilizing as found in experiments in Wisconsin is the immediate stepping-up of yields the first year to high levels. Yields per acre of corn have gone immediately from 35 bushels to 75 bushels and higher, and of hay from two tons to four tons, with greatly increased protein content. If the job is properly done, it is not necessary to wait 5 or 10 years to change the yields from low to high.

The experiments in Wisconsin show that the costs of the additional yields (not counting harvesting costs) derived thru heavy fertilization are only $2 to $3 per ton in the case of alfalfa hay and 10 to 15 cents per bushel for corn and oats. The costs include interest on the outlay for the initial heavy liming and fertilizing, and a reserve to replace the fertility not returned in the crop residues and manure.

After establishment of needed lime and fertility levels by initial heavy applications, you can ordinarily maintain that fertility by the application of 300 to 400 pounds per acre of fertilizer once in a 4-year rotation, and a ton of lime once every 10 years.

Another very important point brought out by the experiments in Wisconsin is the much greater resistance of alfalfa to winterkilling, especially by heaving, on the heavily limed and fertilized land.

The difference may be one of complete kill versus survival of a good stand. A highly fertile and well-limed soil induces a more vigorous and branched root system which is better able to withstand the heaving. It has also been noted that high fertility with adequate lime makes it possible for crops, particularly alfalfa and peas, to withstand the attacks of insects much better than is otherwise the case.

The best stage in a rotation to make this badly needed heavy initial application of lime and fertilizer is when the land is being prepared for a seeding of alfalfa or clover with the usual grain nurse crop. This treatment will insure a vigorous growth of the legume which in turn will supply the much-needed nitrogen and organic matter.

In the atmosphere over every acre of land, there exist, in round numbers, 35,000 tons of gaseous nitrogen. If these 35,000 tons of nitrogen were all transformed to a fixed (nongaseous) form such as ammonium nitrate, the product would have a commercial value as fertilizer of over $5,000,000. Here is virtually a gold mine, seldom worked to capacity. In fact, most crops you grow suffer at some stage because of a lack of nitrogen.

How can you draw upon this huge, inexhaustible supply of nitrogen for crop growth and the addition of much-needed organic matter? By the simple process of growing legumes, which, when properly inoculated, limed, and fertilized have the power of fixing atmospheric nitrogen, which they can then use for the synthesis of proteins and pass along to crops that follow. A season's growth of good alfalfa will fix $10 to $20 worth per acre.

Thus the key to the nitrogen and organic matter problem is high lime-and-mineral fertility, which makes certain a luxuriant growth of superior legumes such as alfalfa and clover. Success with these legumes is the backbone of profitable farming in the North Central States.

They provide the nitrogen needed, not only by themselves, but also much of that needed by the other crops. When crops are properly supplied with minerals and nitrogen, large amounts of residues (often several tons per acre) in the form of roots and stubble are left to add to the organic-matter supply. This, with the manure produced, will maintain an adequate supply of the organic matter essential for maximum crop yields and soil conservation.

High acre-yields in many cases are also the secret of success in erosion control and soil conservation. The doubling and trebling of the yields on the less erosible lands thru adequate liming and fertilizing will make possible return of the more erosible lands to forestry and permanent grass.

Moreover, erosion on the less erosible lands will also be reduced. The best protection against soil erosion is a dense and vigorous vegetative cover, such as is produced quickly and positively when soils are highly fertile. The organic-matter content of the soils will be increased and maintained with consequent better soil granulation and higher infiltration rate of water, and hence, less runoff.

A question often raised in connection with heavy fertilization is that of loss by leaching. Fortunately, soils are so constituted as to prevent loss by leaching. When soluble phosphate and potash fertilizers are applied, the soil forms combinations with the phosphorous and potassium so that these elements are held against leaching but are still quite available to plants, all of which exert a marked feeding power.

Even lime is not lost by leaching nearly as rapidly as formerly believed. It is now found that the annual loss of lime per acre by both leaching and cropping is within 200 pounds, calculated as calcium carbonate.

Thus a ton per acre of ground limestone once in 10 years will supply the need, after a soil has once been brought to the desired level by a healthy initial application.

Crested Wheatgrass

Condensed from The Hereford Journal

Arthur W. Emerson

GREEN pasture is superior to any other feed in furnishing the "nutrients" or feed elements required by farm animals. It is especially rich in protein, calcium, phosphorus and carotene, all of which are needed in large amounts by breeding stock and growing animals.

This information is from Dr. J. H. Longwell, chief of the Division of Animal Industry, North Dakota Agricultural College Experiment Station. Doctor Longwell also says that "disease control is easier when the animals are on pasture, for pastures are more sanitary. Many intestinal parasites and filth-born diseases are transmitted through the soil of dirt lots, but are not likely to be abundant on pasture."

Taking these comments along with like information from other sources it behooves the livestock operator to have as long and satisfactory a grazing season as possible.

Introduced grasses are making a real contribution to this important program of farmers and ranchers for improving pasture the length of the grazing season.

One of the most successful of these grasses is the so-called "glamour grass" of the great plains, crested wheatgrass—a grass from the steppes of Siberia. N. E. Hanson of South Dakota State College brought the first crested wheatgrass from Siberia in 1898. The strain now in popular use came from southern Siberia since the turn of the century.

This grass has an extensive root system, often extending six to eight feet into the soil. It is a cool-season grass, gets off to an early start in the spring, many times four to six weeks ahead of native grasses. Its extensive, hair-like root system makes it valuable as a soil binder against erosion, resistant to cold and drouth, and it will stand seasonal heavy grazing.

One hundred and fifty acres of crested wheatgrass planted in the fall of 1942 and spring of 1943 is paying dividends for Harry Rasmussen, a rancher located near Clearmont, Wyo. This seeding is furnishing spring pasture for 80 head of cows during the latter part of March, all of April and

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the early part of May. In that part of the plains spring grazing on native range is ready about May 15. Mr. Rasmussen is thereby getting two to four weeks earlier grazing as well as letting his native range get into prime condition before "turning on." If there is a fall moisture he will also get two to four weeks more grazing on growing pasture after the "natives" have cured for winter grazing.

Crested wheatgrass has met favor with farmers because it is extremely drought-resistant. It has the ability to go into dormancy during hot, dry periods without killing. It is a high-yielding forage plant when grazed in the spring and early summer. Because normally it goes dormant in late July and August, it is valuable in combination with native grasses which supply their greatest amount of forage during summer months.

The use of crested wheatgrass for hay has saved Jay Simmons, Clareton, Wyo., approximately $700 a year since 1943. Mr. Simmons is a member of the Inyan Kara Grazing Association and has a permit to graze stock as well as cut crested wheatgrass on certain federal lands for hay.

"The big problem in this country is the growing of suitable feed in large enough quantities to prevent loss to livestock during long winter months," states Mr. Simmons, adding, "in 1941 approximately 130 acres of abandoned cropland was seeded by the Soil Conservation Service on land which I have under permit from the Association."

Mr. Simmons' story in May, 1945, is: "Here are some facts about my crested wheat hay which cannot be underestimated. Since 1942, I have cut nine stacks or approximately 90 tons of hay off the 130 acres each year. An average of 225 head of cattle, including my son Elvin's and mine, have been wintered each year from 1942 to April, 1945, and at the present time I have seven stacks of hay left as carry-over.

"If this hay had not been available I would have had to buy at least $700 worth of cake or hay each year. My cattle wintered well and are in excellent condition this spring."

Cole Burton, Piedmont, S. D., in the shadow of the Black Hills has his "two bits worth" to put in on crested wheatgrass. He is a co-operator with the Elk Creek Soil Conservation District and as a part of his complete farm plan planted 70 acres of terraced and contoured land to crested wheatgrass.

"This provides good grazing fully three weeks ahead of any other grass in the spring. It cuts three weeks off of winter feeding, which is a big saving," says Mr. Burton.

Yielded 100 *Tons of Hay in* 1944

Another 60-acre field, seeded in a crested wheatgrass-clover-alfalfa mixture, yielded 100 tons of hay in 1944. Extremely helpful in controlling erosion and increasing production are spreader dams in the fields. They control run-off and conserve moisture.

A newspaper editor up north takes up the cudgel for more pasture and stresses the importance for his area of crested wheatgrass. From a recent issue of the Harvey, North Dakota, Herald, the following is quoted:

"Six out of every 10 farms in Wells County haven't sufficient good pasture to care for their livestock grazing needs. Shortage of grass means low production of butterfat and beef. Overgrazing of any pasture, season after season, results in a continuous increase of weeds and a decrease of grass, the pasture becoming nothing more than a 'stomping' lot. Stock-raising on such a pasture, with the high cost of feed grains, is non-profitable.

"Sufficient good pasture is the cheapest and most profitable means of livestock farming. In many cases the farms needing additional pasture have some poor cropland which would be in better use if seeded to a good grass pasture mixture.

"Seeding of a grass mixture for pasture, of crested wheatgrass, brome grass and western wheatgrass, with an addition of one pound of alfalfa per acre to improve the yield and increase the protein content of the feed, is recommended in this area."

Another northern great plains rancher, John Materi, has utilized a 42-acre field of crested wheatgrass in calving 110 head of cows with excellent results.

The location of Mr. Materi's headquarters, being in a heavy snow-belt area, makes it necessary to have large amounts of feed on hand to get cattle through the winter. By calving time most of the ranchers are out of feed. It is then necessary that additional feed be bought or early grazing must be available if livestock losses are to be avoided.

"I have a 200-acre pasture located next to the ranch headquarters which has been used for calving purposes since 1943. In 1944, my 110 head of cows calved on this pasture with fine results. The cows were on this 200-acre pasture, of which 42-acres is 'crested' for six weeks. In addition to the grazing from the crested wheatgrass field, 20 tons of hay were mowed later in the season.

"Crested wheatgrass is especially valuable as a supplement to native range grass. It is very early and makes for rich green feed when we need it most, that is, at calving time. My experience with this grass leads me to

believe that 'crested' can stand heavy use and should be grazed early. After it heads out the grass gets stemmy and dry and stock will not eat it as well."

"Having my cows concentrated on a small area during calving enables me to give them more care and attention with a minimum of time. Calves get a better start because the cows give plenty of milk much earlier than if grazed on native range or fed dry hay. The use of this grass makes it possible to hold off grazing and conserve native grass for summer use," asserted the rancher.

Authority Gives Planting Directions

Wilkie Collins, Jr., Soil Conservation Service Agronomist, who is today a leading authority on this grass, gives planting directions:

"A firm seedbed is essential—weedfree, preferably; small-grain stubble is the best seedbed. Crested should be planted with an ordinary or semi-deep furrow drill in cool weather—early fall—when grasshoppers are not a factor. The usual rate is four to six pounds per acre, and varies by increasing the amount from west to east. Since it is grown under dry-land conditions, I recommend that it be grown without a nurse crop. It is also suitable in mixtures of other cool-season grasses. Grazing should be avoided or sharply curtailed the first season, while the grass is getting a start.

"Crested wheatgrass is especially well adapted to the northern great plains where temperatures are severe and moisture supply limited, and westward to the Sierra Nevada Mountains. In areas in Idaho it does particularly well, and again in the eastern half of Washington and Oregon.

"Further south it has not given good results except at altitudes of 5,000 feet or more. Farmers should consult local authorities before planting it as far south as the Panhandle country. In the area adjacent to the plains on the east, other grasses are generally more satisfactory. The grass does well on soils of almost any texture ranging from light sandy loam to heavy clay."

Western Nebraska comes forth with some experiences which are worth while to the farmer or rancher planning on planting crested wheatgrass. Three or four years ago Bill and Rolland Roberts, of McGrew, Neb., had a small field that would not grow the good wheat crop that most of their ground produced. They had heard of crested wheatgrass being a drouth resistant and hardy grass so they seeded these fields to crested wheat.

The first season after planting the grass seed it did not seem

that there was much of a stand, they reported to Soil Conservation Service, but they did not give up and simply reseeded the parts of the field on which the stand was poor. At the end of the second year a good stand was established on most of the field and on the rest of it the crested wheatgrass was fairly well established.

When the crested wheatgrass was first seeded a lot of weeds were growing on the field but today the wheatgrass has crowded out practically all of them. Crested wheatgrass is able to do this because its extensive root system robs the weeds of the moisture that they need to grow, the SCS points out.

Crested wheatgrass makes excellent hay when cut at the right stage of growth and both hay and seed crops have been taken from the field. A yield of 200 to 300 pounds of seed to the acre is not unusual.

Gale Peppers, county agricultural agent, Huron, S. D., on July 10 of this year conducted a crops tour in his county. He reported on one farm visited: "One of the outstanding projects inspected on the tour was a field of crested wheatgrass and pasture management on Ole Lindblad's farm. A few years ago this piece of ground was almost worthless. Today it is producing more beef than the average pasture in the county. Ole puts his cattle out on this pasture early in April and takes them to a native grass pasture about July 1 when the crested wheatgrass is in a dormant stage. The cattle are brought back in the fall and kept there until snow covers the land.

Produces Pasture, Hay and Seed

"The advantage of crested wheatgrass is in its very early growth in the spring and its revival in the fall and its high protein content. Mr. Lindblad pastures one animal to two acres, which is in an extremely high per acre production. Some years he cuts a considerable tonnage of hay from the pasture in addition. Mr. Lindblad has also taken enough seed from 90 acres of crested wheatgrass to nearly pay for three-quarters of land. Incidentally he has some of the best Hereford cattle in this area."

For its adapted areas, crested wheatgrass has no peer when grazed during early spring, and as a hay crop when harvested at its peak of protein content.

A longer grazing season means more pounds of beef, better developed livestock and more profits for the livestock producer. Better managed ranges, with each grass grazed during its period of highest feed content, and well-developed water facilities all lead to a more permanent live-

stock industry. It means soil conservation, a contribution to the flood control program of the nation, more water for irrigation, navigation, power and for industry located along the waterways of the nation.

Old Riddle Solved

Condensed from Farm and Ranch

Malcolm Orchard

Associate Editor

THE pasture riddle of the Gulf Coast is being answered in no uncertain language.

In this section of high rainfall and fertile land, pastures never had produced yields until the recent adoption of new ways to fertilize and cultivate legumes.

Now, alert farmers understand why legumes will grow in one pasture and not in another. They can tell you why clovers will grow on the roadsides and not across the fence, and can show you paying pastures thick in this crop.

Much of the acceptance of the new methods in pastures in the mid-Gulf Coast of Texas grew out of the work of the Angleton Experiment Station. Reports from this station show that in 1945, 24 head of livestock grazing phosphated-seeded pastures made an average gain of 278 lbs. per head, while 48 animals grazing non-phosphated native pasture made an average gain of 115 pounds per head. Cost of wintering cattle in the unimproved pasture was about $10 per head greater than in the improved.

In the Angleton experiments the cost of producing a pound of beef in the untreated pastures was 12.02 cents. In the seeded-phosphated pasture the cost per pound including mowing was 8.12 cents. The cost of pasture treatment was $19.44. The length of time the treatment will carry over has not been determined, but it is pointed out by the station workers that this cost shouldn't be charged against the first crop of calves, but should be distributed through the years the treatment is effective. Calcu-

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lating in this manner, it appears that the treatment is profitable. The heifers on the treated pastures wintered well enough and showed enough flesh on May 30 to suggest that phosphated pastures in the Gulf Coast may be used to good advantage in fattening steers.

The news of this work has spread throughout the Gulf Coast region.

There's a 25-acre clover pasture in Bay City that for two years has been producing more grazing than 100 milking Jerseys can consume.

There's a dairyman on the edge of this flat coastal city who figures this pasture worth $25 a day more than unimproved pastures on the same land.

And the extension agent for Matagorda county, John E. Hutchinson, will support the claims of Joe A. Birkner, the dairyman. Each can produce figures and records to show the amazing capacity of this white Dutch clover pasture.

Although this is the most impressive example of legume pastures in Matagorda county, there are 54 other farmers who are showing a profit from following Hutchinson's ideas about legumes and soil improvement.

Birkner and Hutchinson say that the pasture saved enough feed to pay for 1 quart of milk and increased production by much more than 1 quart. Two quarts per cow with 100 cows is 50 gallons of milk. Birkner sells a grade A pasturized product at retail, so the increase in money he receives from this pasture is well worth the extra effort.

Birkner's figures add to about $25 per day for the pasture. Or $1 per acre per day. Using these figures, grazing this pasture ten months during the year allows each acre to contribute $300 a year extra to this dairyman's income.

Birkner has 800 acres of unimproved pasture on which he keeps his dry cows and other cattle. He plans to fence off 35 acres of this for further improvement work.

The methods used by Birkner to get this type of pasture established are as follows:

1. Flat-break in July in 60-foot lands with the dead furrow in the direction of the natural drainage.
2. Allow the land to air-slake until September.
3. Disk in September.
4. Apply 500 pounds of 20% superphosphate to the acre with a grain drill with fertilizer attachment. This should be done by the middle of September.
5. Disk again in the middle of October to destroy weeds.
6. After heavy rains, seed with an endgate seeder with a grass-seed attachment. Birkner seeded his pasture on October 28 and

covered it with a light steel section harrow with the teeth set so the dirt would not roll in front of the crossbars.

Birkner left his pasture until May, then clipped it for seed. The yield was more than enough pay for all expense of seeding preparations and fertilizing.

To start the present trend in pasture improvement in this county, John Hutchinson took some farmers to Angleton to see the work done there by the experiment station. As a result of this tour, four farmers decided to plant demonstration plots. In the meantime, Hutchinson, who was then a vocational agriculture teacher, had his boys plant a plot for demonstration purposes. Each plot contained from 5 to 30 acres planted according to recommendations of the experiment station, plus corrections of observed mistakes that had been made in the early work at Angleton.

In June of 1945, a county-wide pasture field day was held. On this day 10 farmers were in attendance. Half of the day was devoted to a discussion of soil and pasture problems under the leadership of R. H. Stansel, who was then head of the Angleton station. The rest of the day was spent looking at four demonstrations located in different parts of the county on different types of soil.

Before the field day, the local newspaper and chamber of commerce gave pasture-improvement work as much publicity as possible. Full-page ads were carried in the paper with stories, and these stories and ads were reprinted and distributed by the chamber of commerce to all landowners and farmers in the county.

This past year more than 50 farmers conducted demonstrations in the use of legumes in pastures and in soil-improvement work. The interest is increasing at a tremendous rate, and Hutchinson is enthusiastic about the future of this county as a dairy and livestock grazing area.

The Pinto Horse

Condensed from The Cattleman

Hazel Oatman Bowman

THE Pinto Horse Society was founded by George M. Glendenning on September 1, 1941, at Pittsburg, Contra Costa County, California, with aims and intentions briefly outlined, as follows: to gain recognition and to advance the improvement of typical Pinto horses and ponies throughout the United States; to preserve and perpetuate the Pinto horse as a part of our Western heritage; to improve his conformation and breeding for a definite type of horse; to give him an opportunity to compete as a breed and for performance; to keep an accurate record of horses registered with the society, since registration is the foundation of improvement and aggression of any breed.

In regard to the origin of the word, "Pinto," Mr. Glendenning states that it is a derivative of the word "Pinta," which is derived from "pint"—the meaning of which, when asociated with spotted horses, is, according to Webster, "a quantity marked," from the Latin "pinta," to "paint." The word, "pinta," which was the old Spanish- Portuguese version, and was widely used in the primitive European language, means " a small spot." So it is easy to understand and accept the word, "pinto" and "pinta" as referring to a marked or spotted horse. When it is associated with horses, "Pinto" is recognized internationally as meaning a spotted horse of some type or pattern marking, consequently "Pinto" has been accepted as the official name for these spotted horses.

Conjectures are numerous concerning the origin of the term, "Pinto," as applied to horses in the United States and Mexico. It is reasonable to assume that the usage stems from two Spanish words, "pintado" and "pintar," the latter being a verb meaning to paint, color, dapple, and "pintado" being an adjective meaning painted, mottled.

With the arrival of the Conquistadores and their steeds, the first horses seen in the new world, and the introduction of the Spanish language to the Indian population, the graphically descriptive word, "Pinto," was applied to the spotted descen-

Reprinted by permission from The Cattleman, Sept., 1946

dants of the Spanish conquerors' horses. Finally "Pinto" came into common usage in Mexico and the Southwest United States and gradually became the accepted term for a "Paint" horse, a contraction of "pintura," the Spanish word for color, pigment, painting.

Carl R. Raswan, in an article, "The Pinto—A Primeval Horse," in the 1944 official stud book and registry of The Pinto Horse Society, wrote, as follows:

"The Pinto as we know him today is recognized the world over as a distinctive American horse, whose offspring roam from the pampas of Argentina to the forest-meadows of Alaska. His merits and good qualities have been notable to such a great extent that at other times of history and in other lands (in Europe, Asia and Africa) the Pinto played a prominent and romantic role as a war and pleasure horse.

"Modern Pintos of the Americas have degrees of excellence which match the endurance and intelligence of the Arabian; the general utility of the Morgan; the workability and 'cow-sense' of the stock horse, as well as docility and usefulness as a children's pony."

The Pinto Horse Society, through its secretary, points out that there are two types of Pinto horses, namely, the Western Saddle Horse Pinto and the American Parade Pinto.

The Western Saddle Horse Pinto is described as "fleet, agile, hardy, with great ability to maneuver effectively with agility and vigor. He is neat and trim. He must be versatile and of good disposition. His way of going must be symmetrical, vitality high and stamina unexcelled."

Details of this type of Pinto include the following:

HEAD — The well-refined, smooth head should be well set, that is from a side view the face would be nearly perpendicular. A fine muzzle, shallow mouth, not too long a lower lip and large nostrils. Well pronounced jaw discs wide apart. Medium to large eyes, set low and wide apart, appearing to be far out sideways. Small, short ears of refinement, well apart and not too far back.

NECK—A well muscled neck that is preferably arched.

BODY—The back straight and short. The coupling close with well sprung ribs and deep heart girth. The massive chest with legs well apart. Sloping shoulders crowned with serviceable withers.

RUMP—A broad, well-fitted, creased rump of medium slope, that is to say, not flat, neither too steep.

QUARTERS — Rounded, well-filled quarters showing much muscle and extending far down.

LEGS—The pasterns of medium length and slope. The legs flat and small with protruding leaders carrying no flesh. The knee and hocks broad, flat and deep chiseled. The forearms and gaskins with pronounced hard-twisted, angry looking, bulging muscles in abundance, but shapely.

FEET—The shape and size of the dense, tough, flinty foot is comparable to that of the Arab. It is small and oblong with little more length than width, especially so with the rear feet. Correct stance of the rear feet and hocks is with the front of the foot pointing out and the hock pointing in just enough to be off center only. This shape and size of foot and stance of foot and leg is often found on the Steel-Dust Strain of Quarter Horse and on the American Saddle Bred as well as on the Arab.

HEIGHT—Should stand 14.3, however, height may vary from 13.2 to 16.2 hands.

WEIGHT — Should weigh around 1,100 pounds, however, weight may vary from 750 to 1,300 pounds.

In explaining the American Parade Pinto type, Mr. Glendenning says:

"In general, the conformation of this type of Pinto, is virtually the same as that of the Western Saddle Horse Pinto, described above in detail, especially as to head, body, rump, quarters, legs and feet. In regard to the neck, it is necessary for an American Parade Type Pinto to have an arched neck with refinement of throat-latch.

"The neck must be arched from withers, or neck crease, to the point of head crown of bridle.

"In height, the American Parade Type Pinto should stand about 15.2 hands, but may vary from 13.2 to 17 hands. The weight is around 1,100 pounds, but may vary from 750 to 1,400 pounds.

"Never spread or stretch a Pinto. It is unnatural and ill-becoming for a sound horse.

"Whereas it is proper to shorten Western Saddle Horse Pinto's tail, when relaxed to the length of hock point, the tail of the American Parade type Pinto is unthinned and full length, and is never set. The fetlocks of both types are clipped, but only one and one-fourth inches are clipped out of the mane, where the crown of the bridle crosses.

"To be perfect, the American Parade Type Pinto must show extreme refinement throughout. The differences between the two types is that the American Parade Pinto in generally taller and lighter boned per weight, has a full length tail, more arch of neck and local appearances would show more vigor and animation. However, he must be versatile,

docile, tractable, teachable, cool and of good disposition.

"The markings and color of the American Parade Pinto and the Western Saddle Horse Pinto are parallel. The perfectly marked Pinto horse is half color or colors and half white with many spots well placed, edges breaking abruptly with a border or lace. The spots should range in size from about two inches across to about 12 inches across. The spots may or may not be uniform in placement and size, and may or may not be regular in shape."

There are three distinct pattern markings of the Pinto, the Appaloosa, Overo and Tobiana. In cross breeding pattern markings, the offspring may be a mixture of pattern markings of any two or the three. The color or colors, or pattern markings, are not determining factors of the Pinto's breeding.

The common Appaloosa pattern or markings is as follows:

It is a colored horse with a white rump with many colored spots in this white of rump and they also may have a snip, strip or star of face as well as white of any or all pasterns or legs. The leopard Appaloosa pattern markings may well be described as a white horse which may have few or many small colored spots on the body, head and legs.

To portray a word picture of the Overo pattern markings, visualize a colored horse with white areas extending up from belly and lower regions, the tail and dorsal regions frequently colored. Ofttimes much white of face and head, with the legs may be colored, spotted or white.

Perhaps the Tobiana pattern markings could be described as white areas of the dorsal regions extending down including various spots. They frequently have socks or stockings and white of mane and tail. The face and head are frequently marked like a solid color horse.

While Pintos of various colors are judged for Pinto rating without respect for color (color being a matter of personal choice of the individual user or buyer) he states that the national choice for color of Pintos is apparently in this order: black, sorrel, bay, roan, Palomino, buckskin, brown and grey.

As time goes on, the efforts of The Pinto Horse Society will no doubt inspire Pinto breeders to even greater accomplishments in propagating the useful and beautiful Pinto—appropriately called "Our Western heritage."

Post War Machinery for the Fruit Grower

Condensed from American Fruit Grower

A. Van Doren
Ohio State University

THE fruit growing industry has long been typified by the progressive attitude with which it has developed new machines and put them into their operations. The constant urge for perfection in the finished product, the ever increasing pressure of competition and the economic necessity of reducing cost per unit of fruit has been the mother of many humble and sometimes brilliant mechanical adaptations and labor saving devices.

With labor so expensive and in such short supply we need to get the maximum utilization for the labor available to properly handle our crops so that they will be delivered in the best possible condition.

Some of the possibilities are: Electric tractor trucks which may handle one or more stacks of apples instead of our present methods of handling the single box. Stacking machines, both separate or as a part of these electric trucks, which would boost and pile full stacks of apples, or with the use of pallets, several stacks of apples at one time. Mechanical feeding and dumping at our washing and grading machines. Similar equipment is now being used in orange packing houses and could be adapted, with some refinement, to the more easily injured apples. Improved conveyor systems with the elimination of manual handling at turns or cross belts and at elevating and lowering. Power turns or flexible chain belts can perform most manual handling of boxes.

We might also mention the "brush shredder" which shreds up the brush in the orchard as the machine is drawn through the orchard leaving the shreds to serve as mulch and source of nutrients to the orchard soil. The shredder is a hammer-mill type of an affair and is of sturdy construction. Since it grinds limbs up to two inches in size, the power requirement is high and a large tractor with power take off is required to do the job. Where a few growers go in together on such equipment the cost might well be reduced to the point

Reprinted by permission from the American Fruit Grower, July, 1946

where the ease and convenience of such a machine might be shared.

Several types of fertilizer distributors and lime spreaders are available and spot distribution or broadcast can be had at the option of the grower. One simple device for this purpose is the cinder or sand spreader used by the highway department. An adaptation of this principal is to use the rear end of an old car, turning the rear axle one quarter turn so that the drive for the differential faces up and then a disc is mounted on the stub of the shaft extending out from the pinion gear. This device is then equipped with a hopper over the disc and when towed the whirling disc distributes the fertilizers. Various types of grain drills can be used for fertilizer spot distribution work.

A device that greatly speeds up tree removal is the vertical mounted circular saw. When mounted on a tractor with an arrangement for raising and lowering the saw, a large apple tree can be quickly sawed off at ground level. Other electric driven chain saws are available for felling trees and a rapid removal operation can be conducted with such equipment. A somewhat greater disturbance of the soil is usually associated with "bulldozing" out of trees than some orchardists favor, although this method of tree removal is rapid especially if there is space to push the tree out of the orchard for bulk disposal.

Mechanical buckrakes and brush pushers are appreciated by many growers who want to rapidly get their brush out of the way. A wide variety of adaptations have been developed for different makes of tractors and old cars. The more elaborate outfits have hydraulic lifts that handle with ease the heavy pusher attachment, lifting the load of accumulated brush for rapid travel to the disposal area. Other outfits have various screw arrangements or pulleys. A good simple screw hoist can be made out of the steering gear of a car in which the steering wheel shaft is extended to a convenient place for the tractor driver and the driven gear is coupled to a hoist spool. A cable or chain is used to lift the brush pusher attachment.

This attachment is hinged at the rear of the tractor by the means of long poles that extend through from the rear of the tractor and support the teeth and background of the pusher. By simply windowing the brush with pitch forks, large quantities can be rapidly removed from the orchard with a simple brush pusher. The "buckrake as attached to the rear of an old car is less maneuverable in the orchard

and although it is successful in haying, it is not the best arrangement for the orchard Such a device is of value in mowing hay mulch into an orchard.

There is a wide choice of conveyors and elevating devices available to the fruit industry as well as easily made slides and rubber tired trucks. Handy belt pilers and loaders have great appeal to those who load or unload or stack cases of fruit. Units of great flexibility are available or can be made by the grower. Easily assembled conveyor systems can be set up in temporary situations and moved rapidly when needed.

Aluminum picking ladders, although not in general use should soon be available. A light strong ladder is a universal requirement and with the rapid conversion of aircraft plants we should soon have several models of light metal ladders to chose from.

The jeep can find a wide range of uses in the orchard. A wide flat platform built so as to completely surround the jeep is a convenient device for hauling fruit out of the orchard. A low 2x2 inch rail around the platform will keep the fruit on and other slats fastened to the floor will keep crates or boxes from sliding about. Many model A Fords have found service in orchards when stripped down and equipped as described above. Orchard dusting equipment can be installed on jeeps and a dusting program used to supplement disease and control work. The making of irrigation ditches, and light cultivation are well within the scope of the jeep's usefulness, not to mention the endless travel and checking that has to be done in a large planting.

In both disease and insect control, proper timing of the applications is of paramount importance. In recognition of the importance of this point our sprayers have been mounted on very large rubber tires that give greater assurance of getting around in the orchard when it is soft from spring rains. Tractors with wide treads or large tires have been secured. In addition to this the speed of the spraying operation has been greatly accelerated by the use of various types of "speed sprayers." G. W. Daugherty of Florida incorporated the principle of high volume of air movement and low velocity, the spray material being injected into the air-stream which carries it to the trees. The chief advantages of this principle lie in better coverage and less injury to the foliage. With suitable refilling equipment a large amount of spray material may be applied over a considerable area in a relatively short time.

With the advance in refrigeration engineering, fruit growers have been quick to take advan-

tage of cooling their fruit promptly after harvest and holding it in their own cold storage for disposal at the best marketing season. In many cases the grower becomes the retailer and claims the retailer's margin of profits. With multiple unit compressors — so that the starting time of the compressor motors can be separated by a few seconds and thus reduce the size of power lines and load requirements — growers have been able to install suitable cooling equipment on country lines that would not have stood the high starting power requirements of large single motors. The automatic controls available have reduced the attention of watching equipment and temperatures to a minimum. By the simple device of installing oversized blower capacity, growers have learned that it is no problem to maintain enough moisture in the storage atmosphere to prevent the shriveling of the fruit. A relative humidity of 85 to 90 per cent is the best for apples.

Where storage scald is a problem, the gases which cause this disorder can be reduced below the concentration where they cause the trouble by simply employing the principle of the gas mask and filter out these gases by passing the storage air through a suitable quantity of activated charcoal filters and stirring up the air in the storage room so that no local concentration of these scald-causing gases occurs.

The waxing of apples can be accomplished by a machine that simply floods the wax solution over the fruit, and then passes warmed air over the apples as they slowly leave the machine— the vegetable wax is then dried on the apples. The appearance of the fruit is enhanced and shrivel is reduced in storage. Certain types of waxes have been found to reduce the amount of storage scald that might otherwise occur on a given variety of apples.

What's Skimmilk Worth?

Condensed from Hog Breeder

SKIMMILK is one of our most valuable protein feeds for hogs. We once thought it indispensable for successful hog raising. But now we have found out that we can get hogs to market without skimmilk in about the same time and at about as low a cost as with skimmilk. The value of skimmilk for hogs depends largely on three things: (1) Whether the hogs are fed on pasture, (2) how heavy they are and (3) the rate of feeding the skimmilk.

These are the conclusions from a study of 17 feeding trials by seven different agricultural experiment stations. This study was aimed at finding out when and how a farmer can get along without skimmilk or buttermilk and do a good job of raising hogs.

With shelled corn figured at $1.25 per bushel, tankage at $92 per ton, and middlings at $59 per ton, for hogs fed from 2 to 4 pounds of skimmilk in drylot daily, 100 pounds of skimmilk replaced feed worth 86c.

When hogs were fed 4 to 8 pounds of skimmilk daily, the skimmilk replaced 61c worth of other feeds.

When 10 to 32 pounds were used daily per hog, the skimmilk replaced only 42c worth of feed.

At present whole milk prices in Iowa, skimmilk is worth from 75c to $1.30 per 100 pounds, depending on the area.

After reviewing the 17 feeding trials we came to the following conclusions:

1. Skimmilk is hard to beat as a protein supplement for hogs in drylot, especially if some good leafy, green legume hay or alfalfa meal is added to the ration. The farmer who sells whole milk while he feeds hogs in drylot on tankage or soybean meal probably would make more money out of his skimmilk if he gave it to his hogs instead of selling it. The farmer who uses a trio mixture can do about as well with or without skimmilk.

2. Hogs on pasture fed tankage as protein supplement will make about the same average daily gains as hogs fed skimmilk. Farmers selling whole milk are likely to get more out of their skimmilk by selling it than if they were feeding it to hogs on good legume pasture.

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3. Farmers with many hogs and few cows are likely to feed skimmilk in small amounts per hog and hence make more efficient use of the skimmilk than farms with few hogs and large milking herds. Therefore the farmer who emphasizes hog raising is likely to find skimmilk more valuable for feed than the dairy farmer. In Iowa, which averages roughly 7 milk cows and 61 hogs per farm, skimmilk is valued more highly by farm management experts than in Minnesota, which has an average of about 9 milk cows and 26 hogs per farm.

—Condensed from article by Anthony Mathis in "Iowa Farm Science" for August.

The farmer who feeds his hogs from 2 to 4 pounds of skimmilk daily is going to get more value for his milk than the farmer who "pours" it into his pigs.

Skimmilk gives greater returns when fed to light hogs than to heavy hogs.

Skimmilk used as a protein supplement to grains in drylot yields faster average daily gains than tankage.

Trio mixtures (containing tankage, oilmeal and alfalfa meal) in drylot gave about the same results as skimmilk alone.

When tankage and grains were compared with skimmilk and grain for hogs on pasture, the lots fed skimmilk showed little if any advantage in rate of gain.

Barn-Dried Hay

Limited work has been done so far on testing the value of mow-finished hay. Jersey heifers at the Tennessee Experiment Station were divided into groups and fed field-cured, long alfalfa; barn-dried, long alfalfa; and barn-dried, chopped soybean hay. The heifers made close to normal growth and were thrifty in appearance. The group receiving barn-cured alfalfa consumed less hay than those fed the field-cured hay, yet gained more in weight and height at withers. The soybean group consumed less hay than either of the alfalfa groups, and the gain in weight was more than the field-cured alfalfa groups. However, the gains in weight were less than in the group fed barn-cured alfalfa. The gain in height at the withers was more in the soybean group than either of the other two groups.

—*Successful Farming*

When Livestock Hits the "Assembly Line"

Condensed from Missouri Ruralist

Cordell Tindall

PROCESSING meat is big business. Meat packers were the first to develop assembly line technique which is in very general use in automobile and other manufacturing plants today.

The packing plants have grown big because of the size of the job assigned them. The average pound of meat is moved more than 1,000 miles from the producer to the consumer. This is due to the fact that meat is not produced near the great population centers where it is consumed. The bulk of livestock is produced west of Mississippi, and the meat is consumed east of the Mississippi.

Actual processing of the live animals into meat products is efficiency on a grand scale.

A visit to a packing house which prepares meat for other than local consumption leaves you with an appreciation of the giant-size job of feeding the nation, a job in which farmers and food processors share.

One highlight of a recent visit to a Swift and Company plant was a steam table where workers trimmed the hams with specially curved knives. At the 4-man table, capacity speed is about 600 hams an hour. Another similar operation was trimming out the tenderloin. This also was done by razor-sharp knives designed for the job. The workers who do this operation day in and day out make it look easy—but try it!

It's an old joke that the packing houses utilize everything about the hog but the squeal. We actually saw the final step of processing a hog—trimming and cleaning the tails which find a ready market. Another highly specialized product of packing plants is "pig lips"—which are just what they are.

Many of the by-products of the packing plants must be processed before they are marketable. Hides, for example, must be cured before they go to tanners; select fats are made into oleo oil and stearin; other fats are converted into tallow and later into soaps; select bones are sold as raw material for knife handles. Nothing is overlooked. The numerous glands and secretions of cattle, lambs and hogs

Reprinted by permission from the Missouri Ruralist, Sept. 28, 1946

form the basis of a wide variety of medicines.

Because these by-products are a source of additional profit to the packing plants, the producer's livestock is worth more. Actually, animals provide much more than just food.

In addition to the market for by-products, packing plants have a specialized meat trade which must be supplied. One section of a plant is known as the hotel and restaurant room, where beef and lamb are cut and wrapped especially for this trade.

Progressive meat packing house companies continually are seeking to improve on the ways of Mother Nature. One such example is the development of a new lard. By addition of small quantities of vegetable substance, known as gum guaic, it is possible to keep lard without refrigeration. This is said to be one of the biggest developments in lard in 50 years. The problem was to find a method of preparing lard that would not require refrigeration, but at the same time retain in lard the growth-promoting qualities and other advantages. Scientists found that adding the natural juice of the guaiacum tree of the West Indies and Central America protects the lard from oxygen.

Hog farmers have a stake in development of such lard because it will increase the demand for lard by the nation's housewives. And one of the big problems facing hog producers in the coming years is utilization of lard.

Not only does the meat packing industry process the livestock produced on the farms, it also serves as a distributor so that meat can reach the table of the city housewife. Branch houses (sales offices) are maintained in many cities of considerable size. Smaller towns and villages are served by refrigerated cars and by truck routes.

One big company processes food in 50 meat packing plants and 110 dairy and poultry plants. Packing plants and dairy and poultry plants are located in agricultural-producing areas.

The consumer, of course, wants a variety of foods in and out of season and at a low marketing expense. Nation-wide companies, with their wide distribution systems, are able to shift farm products from surplus areas to areas where needed. This keeps distribution running smoothly instead of bogging down in some spots.

In a study of distribution costs of 17 wholesale trades, those of the packing industry were found to be the lowest. One nation-wide packer reports that its profits are less than an average of one fourth cent a pound for all products handled. This is possible because the company annually processes more than 6 billion pounds

of livestock products. Likewise, cost of handling is only about 5 per cent of sales compared to 10 to 20 per cent in certain other businesses.

Branch houses maintained by the packers at strategic points speed meat products to the retailers. This is an important point. Meat packers sell their fresh beef, lamb and pork to the retail trade within 2 weeks after animals have been dressed. Otherwise it would deteriorate in quality and the trade would discriminate against it.

Both producers and consumers often accuse the packers of manipulating or controlling meat prices — consumers when prices are high; producers when they are low. Actually, say packer officials, it would be impossible for them to do this for several reasons.

During normal conditions, they state, packers sell the dressed meat carcasses for less than they pay for the live animals. Contributing to this is the fact that an animal isn't all meat. For example cattle average a yield of 55 per cent meat. Only thru careful handling of by-products can the packer operate in this manner.

Since meat is perishable it must be moved quickly. A packer or group of packers cannot hold onto it indefinitely to force price increases.

Competition for the trade also is keen. There are more than 3,500 meat packers in the United States plus 22,000 other commercial slaughterers. If large companies succeeded in driving out of business all the small packers and slaughterers, a new crop would soon rise to challenge them again.

Fluctuations in prices daily, weekly and monthly, paid producers are due chiefly to the changes in the supply of livestock offered for sale, say packer officials. Over the long-time pull purchasing power of consumers has an effect upon livestock prices. The packer merely is an agent at the mercy of these laws of supply and demand. He cannot regulate either the supply being produced or the demand for the finished product.

Packers say that fluctuations in prices are no more satisfactory to them than to producers. But, until some plan has been devised that will make for orderly marketing, it will be impossible to change the situation.

Ragweed Pollen May Be Eliminated

Condensed from Farm Research

F. G. Smith

RAGWEED pollen in late August and September is the chief cause of "hay-fever." Control of pollen production is, therefore, an important economic and public health problem. In many urban areas in the East and Middle West before the war considerable effort and expense was put into campaigns to eradicate ragweed by cutting or treatment with various herbicides. The end of the war and the success of the new weed-killer, 2,4-D (2-4-dichlorophenoxyacetic acid) in preventing ragweed pollen production will greatly encourage community action in controlling this pest. Since farmers, especially in the vicinity of urban areas, may be called upon to help by cleaning up their own property, it may be of interest to review the problems involved.

Countrywide trials with 2,4-D as a weed-killer in 1944 and 1945 have proved its general advantages: (1) It is effective at low concentrations; (2) it is inexpensive and easy to apply; (3) it is nonirritating to the skin, noncorrosive, and nontoxic to animals; and (4) it is relatively selective in its action.

Trials on ragweed at the Station at Geneva in 1944 and 1945 showed that it is a very effective agent for preventing pollen production in both the common and giant species. Treatments made at weekly intervals starting the last week in July showed that the latest safe date for treatment was at the stage before the pollen-bearing parts of the flower (involucres) had opened and had begun to ripen. This occurred during the first week in August in 1945 in the vicinity of Geneva, N. Y. Treatments at later dates even before pollen had matured did not completely prevent pollen shed later in the season.

Water sprays containing 0.1 per cent 2,4-D and 0.5 per cent Carbowax 1500 were effective when applied at the rate of 100 to 200 gallons per acre and there was evidence that even lower concentrations may be sufficient.

It was also found that 2,4-D could be effectively applied as a fog or aerosol, using oil solutions in a Todd fog applicator. This

Reprinted by permission from Farm Research, Geneva, N. Y., July 1, 1946

method promises several advantages over conventional spray methods in avoiding large volumes of solvent, in swifter application, and in requiring considerably lower cost in equipment.

It is important to point out that, while 2,4-D is relatively inactive toward the grasses, it is active toward most broad leaf plants. Grapes and tomatoes, for example, are quite sensitive to the 2,4-D preparations used on weeds. Furthermore, weather conditions may markedly affect the response of many plants. Until more complete information is available on the selectivity of action of 2,4-D and the conditions affecting it, this material should be used with caution in the vicinity of crop plants.

Chemical Dust Checks Irish Potato Sprouts

Condensed from The Southern Planter

Dr. S. A. Wingard

Plant Pathologist, Virginia Experiment Station

MANY home gardeners grow potatoes each year only to lose the majority of them through sprouting during the poor storage facilities. Therefore, any method of treatment that will prevent such sprouting should be of great practical value, especially for use on table stock potatoes.

Having annually lost the greater part of my potato crop, I was interested to learn in the fall of 1944 that there was a chemical being put out for trial by the American Cyanamid and Chemical Corporation, 30 Rockerfeller Plaza, New York 20, N. Y., that appeared to be effective in preventing potatoes from sprouting in common storage. Some of the material was immediately requested and used on some potatoes stored in my basement where conditions were very favorable for the sprouting. Several bushels of potatoes were left untreated to serve as checks.

The untreated potatoes began sprouting about the middle of January and the sprouts grew very rapidly; whereas the treated

Reprinted from the Southern Planter, Richmond, Virginia, Oct., 1946

ones did not show evidence of sprouting until about March 1 and then the sprouts grew very slowly and remained very short and stubby. By July 1 the untreated potatoes had sprouts 18 to 24 inches long and were completely dried up. The sprouts on the treated potatoes were only 4 to 6 inches long on July 1 and on August 9 the tubers were still fairly sound though rather shriveled.

In 1944 the chemical (methyl ester of naphthalene acetic acid), impregnated in shredded paper, was distributed among the tubers in bushel baskets. Last season it was applied in the form of a dust at the rate of ¼ pound to the bushel, thus giving 9/10 gram of the chemical per bushel.

The treatment was delayed until January 12, 1946, at which time sprouting had already begun but all sprouts were removed before the treatment was made. Sprouting was soon resumed by the untreated potatoes and by April 1, the sprouts ranged from 4 to 8 inches in length; whereas the treated tubers showed practically no sprouting.

On April 22 there was still little sprouting on the treated tubers but the untreated ones had sprouts 10 to 15 inches long and were badly shriveled and worthless. The treated tubers, on the other hand, showed but very little, sprouting on May 23; and on June 19, though badly shriveled, had produced only short, stubby sprouts.

Beef from Less Corn

Condensed from Capper's Farmer

Rex Beresford
Iowa State College

BEEF cattle are adaptable. Feeders are resourceful. These 2 factors combine to stretch corn if need arises. In seasons when grain supplies are short or high priced, experience indicates that corn affords a broad elasticity in beefmaking. That has been proved both by farmers and experiment stations. Two bushels can be made to do the work of 3 in many kinds of cattle feeding.

The possibility becomes important when grain reserves are low. It also suggests how the man who deliberately increases forage acreages can maintain a feeding project on less corn.

Corn saving has not worked equally well or in the same ways with all weights, grades and kinds of cattle. Nor does any corn-saving system work if the goal is high finish in the shortest possible time. If you are out to save corn it may be smart to pick your cattle with that in mind.

Corn saving is easier to do and can go farther with the plainer grades that do not require too high a finish. But it offers attractive possibilities in feeding better grade yearlings or older cattle. It's hard to save corn with calves. The rascals have to grow and finish at the same time. If they don't get the grain they grow but forget to fatten.

Two methods of corn saving stand out. One is the limited or deferred feeding of corn, coupled with the greatest possible use of roughages, particularly corn or sorgo silage or fodder. This system was developed by Dr. C. W. McCampbell of the Kansas station. The good is the maximum use of good pasture. This story tells what has been accomplished in saving corn in dry-lot feeding at the Iowa Experiment Station.

Methods have had to vary with the kind, grade, age, weight and starting condition of the cattle. But it has been found that wide variations may be made in the proportions of silage, fodder or other roughages to grain with almost any sort of cattle from yearlings up without too much difference in final gain and finish.

For the farmer-feeder no other method has been devised that equals heavy silage feeding for

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getting the most beef out of an acre of corn or sorgo.

This is true particularly with the bigger, plainer, steers. The results obtained from 3 different feeding methods with 820-pound medium to good native steers at the Iowa Experiment Station in 1944-45 illustrate the point.

Here's the way they were fed:

Lot I—Full fed shelled corn and silage plus 1½ pounds of soybean meal, alfalfa hay, salt and mineral for 121 days and marketed. Results: gain a steer, 273 pounds; feed, 29 bushels corn, 1.1 tons silage, 180 pounds soybean meal, 120 pounds hay; feed cost, $15.57 for 100 pounds gain.

Lot II—First 90 days, full feed of silage, same amount of hay and supplement as Lot I, no corn; then 76 days more on full feed of corn. Results: gain a steer 309 pounds; feed, corn 20 bushels, silage 2¼ tons, protein 241 pounds, hay 256 pounds; feed cost, $15 for 100 pounds gain.

Lot III—Like Lot II except silage for 120 days, then corn for 60 days more. Results: gain a steer, 318 pounds; feed, corn 15½ bushels, silage 2¾ tons, protein 255 pounds, hay 320 pounds; feed cost $14.84 for 100 pounds gain.

Each of these methods produced satisfactory gains and finish on the kind of cattle fed. The tests showed that such cattle can be finished to satisfactory market condition with very little corn as grain. If more finish is wanted or quicker gains, then more corn must be fed.

Even better grade cattle can be made good enough on less than the conventional full feed. In the 1945-46 feeding trials at the Iowa Experiment Station good to choice 830-pound 2-year-old steers were fed silage, 1½ pounds linseed meal and 1 pound of alfalfa hay a head daily for 60 days and then full-fed corn along with these feeds for the rest of a 143-day period. This lot gained 283 pounds a head against 289 pounds for similar cattle full-fed corn from the start. They lacked enough in finish so they were priced 30 cents a hundred lower, but the selling price necessary to break even was 82 cents under that required by the average of the 2 full-fed lots. Compared with the full-fed cattle the deferred corn lot saved $7.81 a head in feed costs and was cut only $3.34 in price a head, to leave a net of $4.47 to the good. Even more important to the man bent on saving corn, they ate only 22.23 bushels a head against 37.5 bushels for the full-fed steers. It took only 0.19 acre to grow the corn and silage required to produce 100 pounds of gain on the deferred corn cattle against 0.23 acre for the full-fed steers.

Heavy silage feeding at the

start and deferred feeding of corn also has worked well with good to choice yearlings. In a test at the Iowa Experiment Station in 1943-44 yearling steers were fed 175 days on silage, 1 pound of alfalfa hay, 1½ pounds of linseed meal, a simple mineral and salt. Corn was added only for the last 40 days of the period. These cattle gained 344 pounds a head and produced 781 pounds of beef an acre of land required to grow the silage, corn and hay. This was on the basis of yields of 70 bushels corn, 12 tons silage, or 3 tons alfalfa an acre.

Similar cattle, full-fed the same length of time on corn with alfalfa hay for roughage, gained 67 pounds per acre. Putting it another way, 0.44 of an acre grew the silage, corn and hay for a silage-fed steer against 0.84 of an acre for the full-corn and alfalfa fed steer.

For the man who does not have a silo there is still the possibility of saving a lot of corn with fodder. It may be fed whole, chopped or shredded. Harvested as fodder the cattle are still getting the whole crop. You get more beef an acre and can handle more cattle than where grain is the main feed used. Fodder, of course, works better with big cattle than with calves or even yearlings.

In 1937 the Iowa Experiment Station fed 4 lots of common to medium native steers heavily silage or corn fodder rations with sharply limited corn. This was done primarily to deterimne the comparative efficiency of silage, whole, recut and ground corn fodder. The results indicated that any of these methods of preparation of the corn plant were satisfactory for such cattle.

The cattle weighing 857 pounds at the start were fed daily all the silage or fodder they would take, 1½ pounds of cottonseed meal, 1 pound of alfalfa hay with salt and simple minerals self fed. In addition they received 2 pounds of shelled corn daily the first 30 days, 3½ pounds the second 30 days, 5 pounds the third month and were then full-fed corn the last 36 days of the 156-day period. At the finish the silage-fed lot had eaten a little less than 3½ tons of the silage a steer. The fodder lots had consumed about 1½ tons of fodder a steer. The average consumption of other feed for all lots was corn 17½ bushels a head; hay 156 pounds and cottonseed meal 224 pounds. That feed outlay added 356 pounds to the original weight of the average steer and finished him sufficiently well for his grade.

We Took the Job Out to the Land

Condensed from Soil Conservation

Hugh Bennett

For ten years the Soil Conservation Service has operated on a regional basis. The Service has become recognized as an efficient agency; it has gained a reputation at home and abroad for getting the job done fast and well, and Soil Conservation Service procedures are now being used by various other agencies and by a considerable number of foreign countries.

Early in the life of the Service it was decided, for various reasons, not to undertake to do the whole job from Washington. Not that Washington was a bad place to work or anything of that sort, but because the erosion problem is very widely spread about the country and must be solved on the farm.

Accordingly, as much of the work as possible was moved out as close to the land as possible—out where the farmers and ranchers who use the land live.

When I was asked to take charge of a Nation-wide program of soil erosion control, I immediately made up my mind on several points that I considered fundamental. These were along the following lines: We would headquarter in Washington; we would send our specialists out through the country to work with farmers cooperatively; we would treat the land according to its capability (the way the land was made) and its needs (as determined by what man had done to the land); we would carry out a unified rather than a haphazard, piecemeal type of program, indiscriminately applied to the land; and we would check at timely intervals on the effectiveness of the field work by sending out inspectors capable of appraising the job being done for the farmers.

When we started the work in September, 1933, I knew on the basis of 30 years spent in studying the lands of America and other countries that we could not possibly succeed except by treating the land according to its capability and needs. That was predetermined by the natural order of things. So, it was decided in the very beginning—and we still adhere to that decision—that we would work as well as we could along with nature, and not

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against her. And above all, we would not undertake to do the job by inviting farmers into a comfortable room to tell them what to do back on their farms. Our specialists were told to go out on a farmer's land along with the farmer himself and there decide, cooperatively with him, what could and should be done in each of his fields, each pasture, woodlot, gully, and on every acre of idle land and all other land on the farm in order to conserve soil and water. This was done by going carefully over the entire farm, deciding what conservation work needed to be done on the basis of the degree of erosion, the slope, and the kind of soil, and then drawing up a plan for carrying out a complete and properly integrated soil conservation job on the entire farm.

We could never have achieved the tremendously successful soil-conservation accomplishments of the Service if we had not started in this manner, which combines the scientific basis with a practical approach. And we, of course, recognized the necessity of using the accumulated knowledge of science and practice gained around the world through research and farmer experience.

In doing these things we developed the fundamentally sound procedure of moving as much of the Washington office as practicable out to the land—out to the problem we were asked to solve. This move—this decentralization from Washington — has served the Nation in good stead. The job could not have been successfully done—as it is being done—in any other way.

So regional offices were established in appropriate parts of the Nation. Capable representatives were selected and assigned to the regional tasks of helping the Service get the work done efficiently, expeditiously, and according to the capability and needs of the land. Applicable protective measures were duly coordinated to meet the requirements of the land, the climate, and type of agriculture, as well as could be done within the economic limitations of the farmer, his market opportunities, his inclination, and his working facilities.

In order to get things done promptly, it was necessary to have our workers stationed close to the job they were appointed to carry out. This was peculiarly necessary in the coordinated type of work program the Service was conducting, under which specialists in various branches had to acquaint themselves with each other's specialty so that they could work together and perform a completely balanced conservation job on the many kinds of land that make up farms, watersheds, and regions. The special-

ists charged with conducting the program to a *successful end* not only had to work very closely together but had to make their respective skills fit in with, and lend support to, the conservation measures applied to the land by other specialists. Separately, they could do a piecemeal, unbalanced, and unsuccessful job, such as characterized so much work on the land preceding the inception of the program of the Soil Conservation Service. Working together, they were able to do a well-rounded, properly adjusted, efficient job.

It was proposed at an early stage of the Service's life by a number of earnest people who came to see me that we should ask for an allotment of $125,000,000 a year for the Soil Conservation job. We probably could have obtained such an allotment, but my expressed wish was that the Service be given a smaller sum for its operations, because it was felt that with a considerably smaller allotment we could do at that time a more technically sound and fully effective job. I knew there were not available then enough well-trained, capable soil conservationists in the country to carry out a good, scientifically applied, conservation program, such as it was my unalterable determination to do, on a too extended scale. What I asked for was $25,000,000. (I recall also that some of the newspapers got hold of this obstinacy on my part and referred to it as the extraordinary behavior of a peculiar variety of bureaucrat.)

Of necessity, headquarters had to be maintained in Washington. It was vitally necessary, for example, to keep continuously in close contact with such agencies as the General Accounting Office, Treasury Department, Department of Interior, Department of Agriculture, and the Bureau of the Budget. And we had to be prepared to appear at a moment's notice before Congressional committees in connection with appropriations for soil conservation and with proposed legislation dealing with such varied subjects as flood control, water facilities, wildlife, and land use.

It was necessary to have other kinds of offices, also, due to the tremendous expansion of demands of soil conservation work throughout the country and out on our island possessions, State offices and later on, following the establishment of soil conservation districts, district offices had to be established, through which our main job of helping the districts is carried on. Congress tells us to serve the soil conservation districts. The districts are "out there" on the land, and therefore most of our technicians must be "out there" too—not in Washington or in some other

central place remote from field, haylot, and pasture.

In setting up state offices to help with the Nation-wide soil conservation program, based on local, regional, and national land, climatic and agricultural characteristics, it was necessary somehow to avoid the danger of having a multiplicity of local programs grow up in the county. That could easily have come about and it could easily have hurt or killed the entire national program. There probably would have been too many viewpoints —too much insistence by too many people that their own particular bailiwick called for its own particular program.

Soil erosion and the environmental features that govern proper land use and protection do not necessarily stop or change at State or any other artificial boundary lines, but they do stop or change in some degree at regional boundaries.

The United States is a big and complex country—too large, too variable for many to familiarize themselves quickly with all its numerous and widely scattered land problems and their solution. Somewhat like a doctor specializing in a particular branch of medicine, it is generally advisable, and often necessary, to have our young soil conservation technicians get acquainted with the problems of the country regionally. Even the problems of a region are sufficiently complex to call for persistent and energetic study on the part of our specialists in order for them to perform the required high-class scientific work that goes with their assignments to a given region. After they have fully mastered the intricacies of the erosion and water problems—which may take 5 years or more—they can be utilized in other regions. But even under exceptionally favorable conditions—exceptional mentality, experience, energy, and love for the land and the work—our specialists are required to move up from the performance of relatively simple tasks to the more difficult operations; and at all times they need the close help and guidance of our more highly trained and experienced technicians.

Before we went into regionalization, tasks were repeatedly arising in various parts of the country that required much more expert attention than could be provided through the use of men whose experience was limited to relatively small portions of the country. Following the setting up of the regions, there was marked improvement almost overnight.

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

A Living from Bees—By Frank C. Pellett, Field Editor of American Bee Journal. Orange Judd Publishing Co., Inc. $2.25.

America's Garden Book—By Louise Bush-Brown and James Bush-Brown. Charles Scribner's Sons. $3.50.

An Agricultural Testament—By Sir Albert Howard, C.I.E., M.A., former Director, Institute of Plant Industry, Indore. Oxford Univ. Press. $3.50.

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean, School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $3.50.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers. $2.50.

Breeds of Livestock in America—By Henry W. Vaughan, formerly Prof. of Animal Husbandry, Iowa State College. College Book Co. $4.75.

Dairy Cattle Feeding and Management—3rd Edition—By H. O. Henderson, Prof. of Dairy Husbandry, W. Va. Univ., Carl W. Larson and Fred S. Putney. John Wiley & Sons, Inc. $4.50.

Dairy Science—By W. E. Petersen, Ph.D., Assoc. Prof. Dairy Husbandry, Univ. of Minn. By R. W. Gregory. J. B. Lippincott Co. $4.00.

Diseases and Parasites of Poultry — By Edgar Hugh Barger, D. V. M., Berkeley, Calif., and L. E. Card, Ph.D., Prof. of Poultry Husbandry, Univ. of Illinois. Lea & Febiger. 3rd Edition. $3.75.

Farmers of the World—The Development of Agri. Extension—edited by Edmund deS. Brunner, I. T. Sanders, Douglas Ensminger. Columbia Univ. Press (1945). $2.50.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.50.

Farm Management and Marketing—By V. B. Hart, M. C. Bond, L. C. Cunningham, all of N. Y. State College of Agriculture, Cornell University. John Wiley & Sons, Inc. $2.90.

Farm Records—by John A. Hopkins, Ph.D., Asso. Prof. Economics, Iowa State College. Iowa State College Press. $3.00.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. $3.50.

Grow Your Own Fruit—By M. G. Kains, formerly U. S. Dept. of Agri.; Prof. of Horticulture, Penna. State College. Greenberg, Publisher. $3.50.

How to Raise Rabbits for Food and Fur—By Frank G. Ashbrook, Fish and Wildlife Service, U. S. Dept. of the Interior. Orange Judd Publishing Co., Inc. $2.00.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $3.00.

Livestock Production—By Walter H. Peters, Chief, Div. of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $4.00.

Livestock Judging Handbook — By Julius E. Nordby and W. Malcolm Beeson, Ph.D., Asst. Professors Animal Husb., Univ. Idaho. The interstate Printers. $3.25.

Modern Agricultural Mathematics—By Maurice Nadler, B. S., A. M., Dept. of Mathematics, Newtown High School, Long Island. Orange Judd Publishing Co., Inc. $2.00.

Modern Farmers' Cyclopedia of Agriculture—By Earley Vernon Wilcox, Ph.D., formerly U. S. Dept. of Agri. Orange Judd Pub. Co., Inc. $4.50.

Natural Principles of Land Use—By Edw. H. Graham, Chief of Biology Div., Soil Conservation Service. Oxford University Press. $3.50.

Pay Dirt—Farming and Gardening with Composts — By J. I. Rodale. Devin-Adair Co. (1945). $3.00.

Pleasant Valley — By Louis Bromfield, author, farmer, soil conservationist. Harper and Brothers. $3.00.

Pork Production — By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. The Macmillan Co. $4.15.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry. Mo. State Univ. J. B. Lippincott Co. $5.00.

Practical Farming for the South — By Benjamin F. Bullock, now Prof. Rural Education, Atlanta Univ. Univ. of North Carolina Press. $2.50.

Profitable Poultry Keeping—By H. Clyde Knandel, Head, Dept. Poultry Husb., Penn State College. Orange Judd Publishing Co., Inc. $3.00.

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue Univ. The Interstate Printers & Publishers. $2.25.

Seaman A. Knapp—Schoolmaster of American Agriculture—By Joseph C. Bailey, Dept. History and Social Science, Hunter College. Columbia University Press. 1945. $3.25.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.50.

Soil Conservation—By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Dept. of Agric. McGraw-Hill Book Co., Inc. $6.50.

Successful Poultry Management—By Morley A. Jull, Professor and Head of Poultry Dept., Univ. of Maryland. McGraw-Hill Book Co., Inc. $3.50.

Success on the Small Farm—by Haydn S. Pearson, author. McGraw-Hill Book Company. $2.50.

The American Land — Its History and Its Uses — By William R. Van Dersal, biologist in the U. S. D. A. Oxford University Press. $3.75.

The Farm Primer—By Walter Magnes Teller, formerly with the Farm Security Administration, U. S. D. A. David McKay Co. $2.50.

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